Material Management
Works-Talabira
Thermal Power Project
(3 X 800 MW)

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

MATERIALS MANAGEMENT SERVICES INCLUDING RECEIPT, UNLOADING, VERIFYING, SHIFTING, STACKING, PRESERVATION, HANDLING AND HANDING OVER OF COMPONENTS OF BOILER WITH AUXILIARIES INCLUDING MILLS & FEEDERS ETC.; ESP WITH AUXILIARIES, STEAM TURBINE & AUXILIARIES; TURBO-GENERATOR & AUXILIARIES; PUMPS WITH AUX., ROTATING MACHINES, TANKS & VESSELS, COMPLETE ELECTRICAL, CONTROLS AND INSTRUMENTATION EQUIPMENTS, PANELS, CABLES / CABLE TRAYS, AND OTHER RELATED ITEMS INCLUDING ITEMS OF BOILER, TG & BOP'S PACKAGES; HP&LP PIPING; REFRACTORY & INSULATION WITH CLADDING MATERIALS; BHEL T&P; COMPONENTS & EQUIPMENT OF VARIOUS OTHER SYSTEMS, PRE-FABRICATED STRUCTURES, STRUCTURAL & REINFORCEMENT STEEL, CEMENT, SUPPLY INSTALLATION AND MAINTENANCE OF CCTV CAMERA AT NLC TALABIRA TPP 3x800MW (NTTPP), JHARSUGUDA, ODISHA STATE, INDIA

## Volume-IA

BHARAT HEAVY ELECTRICALS LIMITED

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| 1.0 | **PROJECT INFORMATION** | |
|---|---|---|
| **1.1.** | INTRODUCTION AND CLIMATIC CONDITION | |
| **Sl. No.** | **Description** | **Details** |
| 1. | **Project Title** | 3 x 800MW NLC Talabira Thermal Power Project (NTTPP) |
| 2. | **Customer** | NLC India Limited (NLCIL) |
| 3. | **Location** | The project proposed to be located near Kumbhari and Tareikela villages on south west of Brijraj Nagar town on Sambalpur Rourkela highway in Jharsuguda district and ash disposal area is located near Thelkolai village in Sambalpur district. |
| 4. | **Nearest Airport** | Jharsuguda airport at a distance of 21 km, Sambalpur airport at a distance of 35 km Bhubaneswar at a distance of 350 km and Raipur airport is at a distance of approx. 290 km. |
| 5. | **Access By Road/Major Cities** | Nearest Road - Sambalpur **–** Jharsuguda highway after crossing Bhedan River via state PWD road<br><br>Nearest Village - Kumbhari and Tareikela villages on south west of Brijraj Nagar town on Sambalpur Rourkela highway in Jharsuguda district<br><br>Nearest Town - Jharsuguda (approx. 11 km)<br><br>Nearest Railway Station - Jharsuguda on Howrah-Nagpur main (trunk) section is at a distance of 11 km<br><br>Nearest Seaport - Paradeep (Approx. 450 km) and Kolkata (Approx. 550 km)<br><br>State capital - Bhubaneswar (350 km) |
| 6. | **Temperature** | a. Mean Ambient Temperature<br>Maximum 33.1°C |

| | | |
|---|---|---|
| | | Minimum 20.7°C<br>Average 27.5°C<br><br>b. Extreme Ambient Temperature<br>Maximum 48°C<br>Minimum 6°C<br><br>c. Mean Wet-bulb Temperature - 26.3°C |
| 7. | **Seismic Zone** | The project site lies in zone III as defined in IS: 1893. |
| 8. | **Wind Speed** | In accordance with IS-875, for a basic wind speed of 44 m/s, up to a height of 10 meters above mean ground level. Pre-dominant Wind direction is from South-West. |

| **1.2.** | **INSTRUCTIONS TO BIDDERS** |
|---|---|
| 1.2.1. | The Bidder shall visit project site and acquire full knowledge and information about conditions prevailing at site and in & around the plant premises, together with site conditions, transportation routes, various distances, all the statutory, obligatory, mandatory requirements of various authorities and all information that may be necessary for preparing the bid and entering into the Contract. All costs for and associated with site visits shall be borne by the bidder. |
| 1.2.2. | Other contractors would be working in this area and their structures are to be protected. The material brought and stacked for construction should not make hindrance to other contractors. |
| 1.2.3. | The information given herein is for general guidance and shall not be contractually binding on BHEL/Owner. All relevant site data /information as may be necessary shall have to be obtained /collected by the Bidder. |
| 1.2.4. | The contractor, in the event of this work awarded to him, shall establish an office at site and keep posted an authorized, responsible officer with valid Power of Attorney for the purpose of the contract. Any order or instructions of the `Engineer' or his duly authorized representative, communicated to the contractor's representative at site office will be deemed to have been communicated to the contractor at his legal address. |
| 1.2.5. | No claim will be entertained by BHEL on ground of lack of knowledge and the contractor's rates shall be deemed to have taken this into account. |
| 1.2.6. | Bidders may fix up their site visit in consultation with below mentioned contact person:<br>Name: Mr. Subrata Kumar Adak |

| | |
|---|---|
| Designation: | Addl GM ( Project Director ) |
| Email: | subrata.adak@bhel.in |
| Ph no: | 7347031209 |
| Name: | Mr. Chittaranjan Samal |
| Designation: | Sr Manager |
| Email: | csamal@bhel.in |
| Ph no: | 8331936594 |

| | |
|---|---|
| **2.1** | **Scope of Works:** |
| **2.1.1** | **RECEIPT, UNLOADING, VERIFYING, SHIFTING, STACKING, PRESERVATION, HANDLING AND HANDING OVER OF COMPONENTS OF BOILER WITH AUXILIARIES INCLUDING MILLS & FEEDERS ETC.; ESP WITH AUXILIARIES, STEAM TURBINE & AUXILIARIES; TURBO-GENERATOR & AUXILIARIES; PUMPS WITH AUX., ROTATING MACHINES, TANKS & VESSELS, COMPLETE ELECTRICAL, CONTROLS AND INSTRUMENTATION EQUIPMENTS, PANELS, CABLES / CABLE TRAYS, AND OTHER RELATED ITEMS INCLUDING ITEMS OF BOILER, TG & BOP'S PACKAGES; HP&LP PIPING; REFRACTORY & INSULATION WITH CLADDING MATERIALS; BHEL T&P; COMPONENTS & EQUIPMENT OF VARIOUS OTHER SYSTEMS, PRE-FABRICATED STRUCTURES, STRUCTURAL & REINFORCEMENT STEEL, CEMENT, SUPPLY INSTALLATION AND MAINTENANCE OF CCTV CAMERA AND PROVIDING SERVICES FOR MATERIALS MANAGEMENT AT NLC TALABIRA TPP 3x800MW, (NTTPP), JHARSUGUDA, ODISHA STATE, INDIA.** |
| **2.1.2** | Scope of work includes Material Handling and Management (Incl. Issue, verification, stacking, shifting and record keeping etc.) of materials receipt at BHEL Site/ store from various units of BHEL or from any other source of BHEL. Tentative quantities of all such materials expected to be received at site are given in the tender Document |
| **2.1.3** | Unloading of **all types of structural & reinforcement steel and plant equipment's Including heavy consignments and/or over-dimensional consignments** (e.g. columns such as Boiler main column and Power House columns etc., structural materials, HP & IP Modules, LP Turbine, Generator Rotors, LP & HP Heaters, Flash Tanks / Vessels, Transformers and TG equipment's and any other plant materials etc.) directly from trailers by suitable crane/s or by jack & sleeper method as per instruction of BHEL Engineer. |
| **2.1.4** | The required jack & sleeper are to be arranged by the contractor. |
| **2.1.5** | Receipt of materials dispatched by road transport on door delivery basis at the BHEL stores and unloading thereof. |
| **2.1.6** | Collection of materials dispatched by road transport on go-down delivery basis from transporters' go-downs, loading at transporters go-down, local transport up to BHEL stores / storage yard and unloading thereof. |
| **2.1.7** | **Preliminary verification** of all materials at the time of unloading from transport vehicle or while receiving consignments from transporters' Go-down, as the case may be, reporting immediately the discrepancies like damages and shortages noticed. |
| **2.1.8** | Supply and installation of CCTV system around the storage boundary and inside entire storage space. |

| | |
|---|---|
| **2.1.9** | Maintenance of the CCTV system during the contract execution period including extension period (if any). |
| **2.1.10** | **Detailed verification** of materials with reference to packing list and loading advice slip after unpacking of boxes & crates; repacking, where called for, after detailed verification; preparation of receipt inspection reports etc. shall be carried out within the quoted rate within 14 days. If the verification is not carried out within 14 days for reasons attributable to the contractor, then BHEL is having right to deploy the resources and recover the charges thereof from the contractor as per actual rates + 5% overhead rates. |
| **2.1.11** | **Stacking and storing** at BHEL open storage yard / covered stores / closed & semi-closed sheds and submission of stacking / storing records. |
| **2.1.12** | **Preservation of the materials** in accordance with BHEL preservation manual and as per BHEL instructions. |
| **2.1.13** | **General cleaning, grass cutting and upkeep of storage yard, covered and semi-closed stores sheds and regular upkeep of internal drains and roads inside the storage yard shall be in the scope of contractor.** However, Services of Grass cutting shall be payable as per BOQ for menial services (for Grass Cutting). Providing required tools and tackles, safety PPEs, gate pass formalities, insurance of labour and T&Ps, accommodations and any other labour facilities shall be in the scope of Contractor and no separate payment is applicable for the same. |
| **2.1.14** | **Providing Materials Management Services.** |
| **2.1.15** | **Re-handling and restacking** of materials as and when called for by BHEL. This also includes excess / redundant / scrap materials returned to stores by BHEL erection contractors. |
| **2.1.16** | **Handling and loading of outgoing materials** those are to be sent to other destinations including scrap, if any.<br>Note: In case of scrap handling, cutting of scrap in scrap yard to ensure full truck load weight is in the scope of MM agency. Scope of Scrap cutting, if any, shall be treated as extra work. Rate will be finalized in line with the relevant provisions of GCC. |
| **2.1.17** | Lodging of complaint with local authorities for any theft / damage of received/ stored material. |
| **2.1.18** | Record keeping (receipt & issue) of:<br>i) Cement received through trucks/trailers in bulkers/bags at project Site (Where unloading of Cement is not in scope of MM agency) & |

| | |
|---|---|
| | ii) Reinforcement Steel/ Structural Steel (raw) received at project Site (Where unloading of Reinforcement/Structural steel is in scope of Civil agency). |
| **2.1.19** | Handing over of records and materials to another agency. |
| | |
| **2.2** | **SCOPE OF WORK IS FURTHER DETAILED IN VARIOUS CLAUSES HEREAFTER:** |
| **2.2.1** | **MAJOR PACKAGES TO BE HANDLED ARE AS UNDER:**<br>Components of the following major systems are to be handled under this contract:<br>• Boiler & Auxiliaries (Structures, Pressure Parts, Fans, Air pre-heaters, Fuel systems, ducts & dampers)<br>• Mill Bunker Buildings structure, Transfer points, conveyor galleries and its supporting trestles.<br>• Electrostatic Precipitator with HV Rectifier Transformers and auxiliaries.<br>• Coal Mills & Feeders with associated auxiliaries (Pulverised Fuel system).<br>• Complete Insulation, Refractory, Lining, Ancillary and cladding materials.<br>• Turbines, Turbo-generator auxiliaries, condenser, pumps with drive motors and their associated equipment's & auxiliaries, HP & LP heaters, heat exchangers, de-aerating heaters and other consumables & lubricants etc.<br>• Power cycle pumps with auxiliaries, Tanks & Vessels.<br>• Controls & Instrumentation Systems for Boiler, ESP and their auxiliaries<br>• STG & Aux controls and instrumentation and accessories including cables, trays etc.<br>• Power cycle piping, valves, Hangers & Supports including HP & LP bypass systems.<br>• Low Pressure piping system.<br>• Circulating water pipes, filter, plate type heat exchanger, CW booster pumps with drives, DM cooling water system and drives, and aux cooling water pumps.<br>• Generator relay protection panels and auxiliaries<br>• LT switch gears, Electrical and pneumatic actuators and motors.<br>• Boiler piping and TG cycle piping, tanks, vessels etc.<br>• Electrical Panels, cables, cable trays and accessories.<br>• PEM supplied items<br>• HP & LP Chemical dosing system.<br>• Thermal insulation & cladding.<br>• Other BHEL supplied (manufactured/bought out items). |

- BOP Package items
- Misc. Cranes & hoist.
- Cable & cable trays etc.
- Tanks
- Fabricated Structures
- Structural steel items, Reinforcement.
- Cement (bag and bulkers, as specified elsewhere)
- Construction equipments (including cranes, portal gantry cranes, IHE and any other equipment) of BHEL sent in assembled/dismantled condition and other items received from other sites/locations.
- Materials and consumables required for erection & commissioning of plant.

The above list is not exhaustive; it only includes most common major packages. It should in no way be a basis for any claim/dispute on account of any variation. The intent of specification is to provide the complete material handling and material management services. All the work shall be carried out as per the instructions of BHEL engineer which shall be final and binding on the contractor.

**2.2.2** **Some of the Major Heavy Single Consignments are as furnished below:**

| S.N. | Item Description | Approx. Wt. |
|---|---|---|
| 1 | Ceiling Girder – Heaviest Piece (height 7M, width 1.5 M, length 13 M) | 70 MT |
| 2 | HP Turbine (L-6745 X W-3810 X H-3495 MM) | 123 MT |
| 3 | Generator Rotor (L-14755 X W-1910 X H-1915 MM) | 98 MT |
| 4 | Generator Stator (L-10880 X W-5104 X H-4950 MM) | 466 MT |
| 5 | Generator Transformer (L- 7500 x W- 4200 x H- 4800 MM) | 280 MT |
| 6 | Station Transformer (L- 8000 x W- 4000 x H- 4500 MM) | 237 MT |
| 7 | Cabins/Crawlers/counter weight of BHEL Cranes | Up to 65 MT |

**The weight & Quantities indicated above are only the tentative indication and should in no way become a basis for any claim on account of any variation in actual weight. Work shall be carried**

<table>
<tr><td></td><td>out for all the Equipment's received from various manufacturing units and their vendors for the project.<br><br>* Note: Unloading of Generator Stator weighing 466 MT with dimension L-10880 X W-5104 X H-4950 is currently not envisaged in the scope of this work. However, on the direction of BHEL engineer the agency shall carry out the unloading of the Generator stator. The decision of BHEL engineer is binding on the agency. A lumpsum amount of ₹ 439,197/- shall be paid to the agency for generator stator unloading which shall be inclusive of charges of T&Ps required for the work except for saddle which shall be provided to agency free of cost.</td></tr>
<tr><td></td><td></td></tr>
<tr><td>2.2.3</td><td>Major Unloading quantities:</td></tr>
<tr><td></td><td><table>
<tr><td>Total Approx. Weight of Project material to be unloaded:</td><td>363493 MT</td></tr>
<tr><td>Total Approx. Weight of Structural steel & TMT to be unloaded:</td><td>32195 MT</td></tr>
<tr><td>Total Approx. Weight of Cement, TMT, Structural Steel to be managed:</td><td>406688 MT</td></tr>
</table></td></tr>
<tr><td>2.2.4</td><td>The intent of specification is to provide Material Handling and Materials Management services according to the most modern and proven Techniques and codes. The omission of specific reference to any method, equipment or materials necessary for proper and efficient unloading, transportation, verification, stacking & preservation etc. shall not relieve the contractor of the responsibility of providing such facilities to complete the work without any extra compensation.</td></tr>
<tr><td>2.2.5</td><td>All the work shall be carried out as per the instructions of BHEL engineer. BHEL engineer's decision regarding correctness of the work and method of working shall be final and binding on the contractor.</td></tr>
<tr><td>2.2.6</td><td>The contractor shall perform all required services which may not be specified herein but nevertheless required for the completion of work within quoted rates.</td></tr>
<tr><td>2.2.7</td><td>All necessary certificates and licenses required to carry out this work are to be arranged by the contractor expeditiously. The Contractor shall obtain independent Labour License under the Contract Labour (Regulations and Abolition) Act, 1970 for engaging contract labour as required from the concerned Authorities based on the certificate (Form- III or as applicable) issued by the Principal Employer/Customer.</td></tr>
<tr><td>2.2.8</td><td>All cranes, transport equipment's, handling equipment, tools, tackles, fixtures, equipment, manpower, supervisors/engineers, consumables (excluding those indicated as BHEL scope), etc. required for this scope of work shall be provided by the contractor.</td></tr>
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<tr><td>2.2.9</td><td>All expenditure including taxes and incidentals in this connection will have to be borne by the contractor unless otherwise specified in the relevant clauses elsewhere here. The contractor's quoted rates shall include of all such contingencies. In this connection refer relevant clause of general conditions of contract.</td></tr>
<tr><td>2.2.10</td><td>BHEL issued materials & T&P, shall not be under any circumstances whatsoever, and shall be taken out of the project site unless otherwise permitted by BHEL for outside job.</td></tr>
<tr><td>2.2.11</td><td>Calibration and day to day operation and maintenance of BHEL owned weighbridge/s is included in the scope of this work including calibration fee and Liaoning with statutory authority for timely re-calibration etc. Payment shall be made to contractor as per relevant BOQ item rate.</td></tr>
<tr><td>2.2.12</td><td>SUPPLY INSTALLATION AND MAINTENANCE OF CCTV CAMERA IN STORAGE AREA (At Storage yard space Locations)</td></tr>
<tr><td>2.2.13</td><td>Supply & installation of IP based CCTV system for storage areas, geofenced with fixed camera around the boundary and covering of entire inside area of storage (both open yards and covered sheds) with cameras such that there should not be any dark patch. Surveillance camera should have a backup of at least Three months. All hardware and software required to meet above intent shall be in the scope of bidder.</td></tr>
<tr><td>2.2.14</td><td>Comprehensive maintenance of the CCTV system including all components of the original supply scope as well as accessories, required for keeping the CCTV system operational.</td></tr>
<tr><td>2.2.15</td><td>The scope of spares and consumables as may be required is included in the scope of Contractor at no extra cost to BHEL.</td></tr>
<tr><td>2.2.16</td><td>Contractor shall monitor the operations of CCTV in store yard. Contractor shall immediately inform BHEL in writing, in case any CCTV camera/ necessary component is found non-operational. The faulty component shall be restored within three days from the date of intimation by BHEL/Contactor. BHEL shall be informed in writing about the daily status of material handling activities carried out in the area where CCTV surveillance not being carried out.</td></tr>
<tr><td>2.2.17</td><td>The agency shall handover all CCTV camera and related accessories including hardware and software to BHEL after completion of contract.</td></tr>
<tr><td>2.2.18</td><td>The contractor shall provide the following components for the surveillance system of the storage space. The quantity mentioned is tentative and may be changed to suit project requirement as decided by BHEL Engineer.
<table>
<tr><th>Sl. No.</th><th>Name of Item</th><th>Quantity</th></tr>
<tr><td>1</td><td>IP based PTZ dome camera along with p2p/ PMP Outdoor CPE Antenna for wireless communication. <Server based architecture with licenses></td><td>8 nos. (tentatively)</td></tr>
<tr><td>2</td><td>IP based Fixed bullet camera along with p2p/PMP Outdoor CPE Antenna for wireless communication. <Server based architecture with licenses></td><td>60 nos. (tentatively)</td></tr>
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| | | | |
|---|---|---|---|
| | 3 | CCTV camera **database redundant server** (Shall work in redundant mode, one primary and another secondary server) & Video Management Software | 1 set. (2 nos. server) |
| | 4 | LED Display Screen – Min. 50" | 2 No. |
| | 5 | All hardware/software including network switches, other mounting & electrical accessories including cables, adapters, Fiber Optic, patch cord, housing, connectors, junction boxes, etc. | As required. |
| **2.3** | Considering the fact that storage areas shall be developed progressively, it could be required that contractor has to mobilise its Camera Installation resources multiple times in the beginning for completing the set-up. | | |
| **2.4** | BHEL reserves the right to recover from the contractor any loss arising out of damage/ theft or any other causes or during unloading/ verification/stacking or at any time under the custody of the contractor due to negligence/ carelessness on the part of the contractor. | | |
| **2.5** | The bidder shall arrange skilled/ semiskilled/ unskilled labour (from local source(s) as far as available). | | |

| Sl. No. | Description | SCOPE | | REMARKS |
|---|---|---|---|---|
| | | BHEL | BIDDER | |
| **3.1** | **Establishment:** | | | |
| **3.1.1** | **For Construction Purpose:** | | | |
| a | Open space for office (as per availability within project premises) | Yes | | Location will be finalized after joint survey with owner. |
| b | Space for storage (as per availability within/nearby project premises) | Yes | | Location will be finalized after joint survey with owner. **Note:** There can be more than one location of open storage yard, closed shed/ Semi Closed shed. Bidder shall make his establishment accordingly for material handling and MM services. |
| c | Construction of bidder's office, canteen and storage building including supply of materials and other services | | Yes | |
| d | Bidder's all office equipments, office / store / canteen consumables | | Yes | |
| e | Canteen facilities for the bidder's staff, supervisors and engineers etc. | | Yes | |
| f | Firefighting equipment like buckets, extinguishers etc. | | Yes | |
| g | Fencing of storage area, office, canteen etc of the bidder | | Yes | |
| **3.1.2** | **For living purpose of the bidder:** | | | |
| a | Open space for labour colony | | Yes | Contractor has to make his own arrangements for shelter and transportation of labours as per requirement. |
| b | Labour Colony with internal roads, sanitation, complying with statutory requirements | | Yes | Construction Plan shall be approved by BHEL/Customer. |
| **3.2** | **Electricity:** | | | |
| **3.2.1** | **Electricity for construction purposes (for Site/Project works only) 3 Phase 415/440 V** within project premises. | | | Free |
| a | Single point source (free) | **Yes** | **Yes** | Construction Power shall be provided at single point source on free of charge basis as and when made available at site, however contractor has to |

| Sl. No. | Description | SCOPE | | REMARKS |
|---|---|---|---|---|
| | | BHEL | BIDDER | |
| | | | | make his own arrangement to meet power requirement in case of delay in availability of single source or any kind of power interruptions during the course of the project. |
| b | Further distribution including all materials, Energy Meter, Protection devices and its service | | Yes | |
| c | Duties and deposits including statutory clearances if applicable | | Yes | |
| **3.2.2** | **Electricity for office, stores, canteen etc. of the bidder within project premises** | | | **Chargeable Basis** |
| a | Single point source (Chargeable) | **Yes** | **Yes** | However, contractor has to make his own arrangement to meet power requirement in case of delay in availability of single source or any kind of power interruptions during the course of the project. The Power consumed by the contactor shall be chargeable based on prevalent rate of DISCOM (OERC guidelines). The contractor has to Provide necessary meter for measuring the power consumption. |
| b | Further distribution including all materials, Energy Meter, Protection devices and its service | | Yes | |
| c | Duties and deposits including statutory clearances if applicable | | Yes | |
| **3.2.3** | **Electricity for living accommodation of the bidder's staff, engineers, supervisors, labour Hutment etc.** | | | **Contractor has to make his own arrangements** |
| a | Single point source | | Yes | |
| b | Further distribution including all materials, Energy Meter, Protection devices and its service | | Yes | |
| c | Payment/Duties and deposits including statutory clearances if applicable | | Yes | |
| **3.3** | **Water Supply:** | | | |

| Sl. No. | Description | SCOPE | | REMARKS |
|---|---|---|---|---|
| | | BHEL | BIDDER | |
| **3.3.1** | **For construction purposes:** | | | |
| a | Making the water available at single point | Yes | Yes | BHEL shall provide water supply free of cost (at single point source) for construction purpose as and when made available by customer tentatively 03 months from the date of start of work. However, contractor may initially make his own arrangement for water supply till source is obtained from Customer. |
| b | Further distribution as per the requirement of work including supply of materials and execution. | | Yes | |
| **3.3.2** | **For construction of bidder's office, stores, canteen purposes:** | | | |
| a | Making the water available at single point | Yes | Yes | Chargeable basis. |
| b | Further distribution and treatment as per the requirement of work including supply of materials and execution | | Yes | |
| **3.3.3** | **Water supply for Living Purpose** | | | **Contractor has to make his own arrangement** |
| a | Making the water available at single point | | Yes | |
| b | Further distribution and treatment as per the requirement of work including supply of materials and execution | | Yes | |
| **3.4** | **Lighting** | | | |
| a | For construction work (Supply and execution of the lighting work/ arrangements) | | Yes | For office, stores, canteen etc. of the bidder; Illumination shall be in Contractor scope. |
| b | Lighting for the living purposes of the bidder at the colony / quarters | | Yes | |
| **3.5** | ***Communication facilities for site operations of the bidder*** | | | |
| a | Téléphone, internet, intranet, e-mail etc | | Yes | |
| **3.6** | ***Demobilization of all the above facilities*** | | Yes | |

| Sl. No. | Description | SCOPE | | REMARKS |
|---|---|---|---|---|
| | | BHEL | BIDDER | |
| **3.7** | **Execution facilities and Site Construction Management:** | | | |
| **a** | Preparation of site execution schedules and other input requirements as per Form-14. | Yes | Yes | In consultation with BHEL |
| **b** | Review of performance and revision of site execution schedules in order to achieve the end dates and other commitments | Yes | Yes | In consultation with BHEL |

Note:

1. There can be more than one location of open storage yard, Closed shed/ Semi Closed shed inside and outside project premises), bidder shall make his establishment accordingly for Material Handling and MM services. Bidders to note that currently covered storage sheds are envisaged inside the plant boundary and Open storage yard is envisaged both inside (minor portion) and outside (major portion) the plant boundary (in a vicinity of around 5 Km).
2. Bidder has to make his own arrangement at his cost till the construction power by BHEL is established.
3. Furnishing all labour, materials, supervision, construction/Material Handling plans, equipment, supplies, transport, to and fro the site, fuel, electricity, water and all other incidental items and temporary works not shown or specified elsewhere but reasonably implied or necessary for the proper completion, maintenance and handling over shall be in the scope of contractor.
4. Giving all notices, paying all fees, taxes etc., in accordance with the general conditions of contract, that is required for all works including temporary works.

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| **3.8** | **Land/Open Space:-** |
| **3.8.1** | Availability of land within plant boundary is very limited and the contractor has to plan and use the existing land considering the use of land by other Civil /Mechanical/ Electrical contractors and the storage of plant machineries and materials. The existing land shall be shared by all erection agencies. BHEL shall provide free of charge limited open space for office, storage area for vendor's material and T&Ps and laydown area as and where made available by Customer. |
| **3.9** | **Labour and Staff Colony:**<br>**Following are in the Bidder's scope of work for labour & staff colony:** |
| **3.9.1** | Labour colony is to be developed / arrange by bidder for all the labourers required to be deployed for the works. All labour colony set-up is to be developed / arranged as per specifications, drawings, standard approved by BHEL/Customer and in compliance of statutory requirements. |
| **3.9.2** | Land for labor colony shall be arranged by Contractor at their own cost as per availability outside project area within 5Km, Necessary levelling/dressing of land shall be done by the contractor. All arrangement for electricity and drinking/service water to be arranged by the contractor within his quoted price.<br>However, if customer provides land to BHEL for development of labour colony during the execution of the project, same may be made available to the bidder at the same terms & conditions (including rates) as applicable for BHEL. Bidder should indemnify BHEL for all the charges levied by Customer for such land, if applicable. Necessary levelling/dressing of such |

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| | allotted land shall be done by the contractor. All arrangement for electricity and drinking/service water to be arranged by the contractor within his quoted price. |
| **3.9.3** | Development of Bidder's temporary staff colony and labour colony having adequate no. of rest rooms along with toilets & fencing etc. |
| **3.9.4** | All Civil and Structural work associated with drinking and service water for Bidder's labour and other personnel at the work site/colony/offices including pump houses, pipes, overhead tank, tube wells etc. |
| **3.9.5** | Providing and maintaining facilities for safety, welfare, drinking water and sanitation, hygiene, biennial health check-up etc. for construction workers at their workplaces as well as at labour & staff colonies. |
| **3.9.6** | Development and maintenance of above facilities for construction workers deployed by the Contractor shall solely rest with the Contractor. |
| **3.10** | Installation of necessary amenities and temporary infrastructure at Project site locations- Following are the minimum amenities to be provided by the bidder within the quoted price including removal/disposal of the same in environment friendly manner after its intended use/completion of scope of work:<br><br>i. Labour rest sheds near work spot.<br>ii. Canteen facility creation / arrangement.<br>iii. Drinking water facility.<br>iv. Labour Bio toilets near work spot in sufficient nos. with regular cleaning & maintenance arrangement.<br>v. Labour colony should have all hygienic condition, dining hall, toilets, proper sewerage system, good drinking water arrangements.<br>vi. Regular fogging in the work place and labour colony to avoid mosquitoes.<br>vii. Statutory documents shall be submitted along with RA Bills for processing of Bills. |
| **3.11** | **Construction Power:** |
| **3.11.1** | Construction Power shall be provided at single point source on free of charge basis as and when made available at site at a distance of approx. 500 meters as finalised at site, however contractor has to make his own arrangement to meet power requirement in case of delay in availability of single source or any kind of power interruptions during the course of the project.<br>However, it may be noted that apart from above, Power source for CCTV Camera shall be provided by BHEL at ground level at each of the pole from where Power will be utilized for CCTV Operation. |
| **3.11.2** | Contractor shall make necessary arrangements for onward distribution of construction power taking due care of surrounding construction activities like movement of cranes & vehicles, civil work, fabrication/construction/assembly/ erection etc. and safety of personnel. It may become necessary to relocate some of the installations to facilitate work by other agencies or by him. |
| **3.11.3** | It shall be the responsibility of the Contractor to provide, maintain the complete installation on the load side of the supply with due regard to the safety requirements at site. All cabling and installations shall comply in all respects with the appropriate statutory requirements. The installation and maintenance of this shall be done by licensed and experienced electrician. |

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| **3.11.4** | Contractor himself shall be responsible for any loss or damage to their equipment as a result of variations in voltage or frequency or interruptions in power supply. |
| **3.11.5** | Supply of electricity shall be governed by Indian Electricity Act and Installation Rules and other Rules and Regulation as applicable. The contractor shall ensure usage of electricity in an efficient manner and the same may be audited by BHEL time to time. In case of any major deviation from normally accepted norms is observed, BHEL will reserve the right to impose penalty as deemed fit for such cases. |
| **3.12** | **Construction water:** |
| **3.12.1** | Construction Water may be provided at single point on free of charge basis as and when made available at site (tentatively 03 months), however contractor has to make his own arrangement to meet Water requirement in case of delay in availability of single source or any kind of interruptions during the course of the project. Bidder has to make arrangement of further distribution of water at his own cost. No extra payment shall be made under this account. |
| **3.12.2** | void |
| **3.12.3** | Contractor to satisfy himself that the water drawn by him is fit for construction / consumption and adequately treat such water at his cost when it is not found fit for the said purposes. |

**4.0 LIST OF TOOL & PLANTS TO BE DEPLOYED BY THE CONTRACTOR**

**4.1** Numbers of T&Ps to be deployed at site shall be decided with respect to Monthly plan and review formats (F-14) based on site requirement. Below given Quantities of T&Ps/ Equipment are tentative and for initial planning purposes by the bidder.

**4.1.1 List of Major Tools and Plants**

| SN | DESCRIPTION OF EQUIPMENTS | Deployment period | | | |
|---|---|---|---|---|---|
| | | Tentative Deployment | Tentative Duration | QUANTITY | REMARKS |
| 1. | Crawler Crane/Mobile Crane (Telescopic boom, hydraulically operated with Turret Function)- 40 MT | 1st Month | 50 Months | 01 | To be deployed as per instruction of BHEL Engineer. |
| 2. | 75/80 MT Basic Capacity Tyre Mounted Crane | 6th Month | 32 Months | 01 | To be deployed as per instruction of BHEL Engineer. |
| 3. | Crane - Forklift 5 Ton capacity with 3M lift Double mast type | 12th Month | 28 Months | 01 | To be deployed as per instruction of BHEL Engineer. |

**4.1.2 List of Other Tools and Plants:**

| SN | Description of Equipment | Deployment period | | | Remarks |
|---|---|---|---|---|---|
| | | Tentative Deployment | Tentative Duration | Tentative Quantity | |
| 1. | Pick & carry type tyre mounted mobile crane (Farana)- 14/17MT<br>Note: **Hydra is not allowed.** | 1st Month | 58 Months | 01 | To be deployed as per instruction of BHEL Engineer. |
| 2. | Pick & carry type tyre mounted mobile crane (Farana)- 14/17MT MT<br>Note: **Hydra is not allowed.** | 4th Month | 52 Months | 01 | To be deployed as per instruction of BHEL Engineer. |

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| | 3. | Pick & carry type tyre mounted mobile crane (Farana)- 23MT<br>Note: **Hydra is not allowed.** | 4th Month | 52 Months | 01 | To be deployed as per instruction of BHEL Engineer. |
| | 4. | TRAILER WITH PRIME MOVER-40T or above | 4th Month | AS REQUIRED | 02 | To be deployed as per instruction of BHEL Engineer. |
| | 5. | TRACTOR TRAILER-15/20MT | AS REQUIRED | AS REQUIRED | | To be deployed as per instruction of BHEL Engineer. |
| | 6. | TRUCK-ADEQUATE CAPACITY | AS REQUIRED | AS REQUIRED | | To be deployed as per instruction of BHEL Engineer. |
| | 7. | WOODEN SLEEPERS(*)-Assorted sizes (3' ft x 6'' x 6'') | Assorted sizes<br>(3' ft x 6'' x 6'') | 2000 Nos | | 25% BY FIRST MONTH AND BALANCE WITHIN 3rd MONTH. |
| | 8. | SLINGS, 'D'-SHACKLES, MAX PULLER.- 01 MT TO 10MT | 01 MT TO 10MT | 30 PAIRS | | To be deployed as per instruction of BHEL Engineer. |
| | 9. | SLINGS, 'D'-SHACKLES, MAX PULLER, PULLEY BLOCKS, HYDRAULIC JACKS, ETC ABOVE 10 MT. | AS REQUIRED | AS REQUIRED | | To be deployed as per instruction of BHEL Engineer, WITH TEST REPORTS |
| | 10. | SPANNER SETS RING/D | UP TO 56 MM | TWO SET. | | To be deployed as per instruction of BHEL Engineer. |
| | 11. | Tarpaulin (Fire Proof) | Assorted Size | 50 nos. (covering 25000 SQ FT of area) | | Mentioned quantities to be deployed as per Instruction of BHEL Engineer within the |

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| | | 400 Gram/sq meter (GSM) | | | quoted rate. Beyond the mentioned Quantities Tarpaulins shall be procured & provided by BHEL.<br>Size to be decided at Site in consultation with BHEL Engineer. |
| | 12. | Void | | | |
| | 13. | Grease for preservation of BHEL's equipment. (EP-2 or equivalent) | As per requirement | 600 Kg | 600 Kg to be supplied within the quoted rate. Additional, BHEL will supply. |

Only for items/ T&Ps mentioned in BOQ, payment shall be made by BHEL. Other T&Ps/items as indicated above shall be provided by Contractors within the quoted rates.
**Note: Contractor shall provide Operator, Fuel, consumables etc. (i.e. complete operation) for Cranes/ T&Ps to be deployed by contractor, for execution of work as per their scope, within the quoted rates and no separate payment shall be made for the same.**

End cap of various coils, pipes etc. if required, to be re- installed, the same shall be installed by the contractor within the scope of this tender. End cap will be provided by BHEL.

**MEASURING AND MONITORING DEVICES (MMD):**
AS PER REQUIREMENT TO BE FINALISED AT SITE, CONTRACTOR SHALL MEET THE REQUIREMENTS AS PER FQP/MANNUAL ETC.

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| **4.2** | **Note:** |
| **4.2.1** | The above list is only indicative and neither exhaustive nor limiting. contractor shall deploy all necessary T&P (calibrated) to meet the schedules & as prescribed by BHEL engineer and required for completion of work. Quantities (as required) may be mutually agreed upon and minutes of meeting duly signed for deployment. |
| **4.2.2** | For Heavy equipment such as crane, winch machine, etc., the age of the contractor deployed Heavy Equipment, at the time of deployment, as indicated above should be preferably less than 15 years. In case of old age cranes (i.e. age of crane is more than 15 years), the deployment and usage of crane shall be subject to acceptance of BHEL/customer, meeting fitness standards. Contractor has to provide documentary evidence/ proof for age of the crane at the time of deployment to BHEL Engineer. |
| **4.2.3** | Considering operational safety, contractor to note that Hydra Shall not be used for material transport. agencies have to deploy the New Generation Pick & carry tyre mounted mobile crane (Farana) of required capacity. |
| **4.2.4** | Regular maintenance period of one day per month shall be permitted and Preventive maintenance period of six days per year with each spell not exceeding three days shall be permitted for the T&Ps. |

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| **4.2.5** | VOID |
| **4.2.6** | All above T&Ps are to be deployed by contractor as and when required as per instruction of BHEL engineer. In case Contractor fails to deploy T&Ps as per requirement of BHEL and work gets delayed/hampered due to non-availability of above T&Ps, BHEL reserves the right to deploy own/hired/otherwise arranged resources and recover the expenses incurred from the dues payable to contractor. Recoveries shall be actual expenses incurred plus 5% overheads/ "**BHEL internal T&P hiring rates**".<br>Note: In case of deployment of those T&Ps by BHEL for which item rates are indicated in BOQ, due to reasons attributable to contractor as indicated above, differential of expenses incurred by BHEL/ BHEL internal hiring rates and Corresponding BOQ rate of that T&P, shall be recoverable along with 5% overheads, as applicable. |
| **4.2.7** | IF ABOVE MENTIONED T&P ARE NOT DEPLOYED IN SPECIFIED TIME BHEL SHALL RESERVE RIGHT TO LEVY PENALTY ON CONTRACTOR. |
| **4.2.8** | **Penalty due to non-availability of T&Ps:**<br>In order to meet the site requirement and in line with monthly plan and review format (F-14), Contractor has to mobilise their T&Ps and make it available at site for required activities.<br><br>If contractor fails, due to the cases mentioned hereunder, BHEL shall be entitled to impose penalty on Contractor till any alternate arrangement is made by 'Contractor' OR 'BHEL (on cost recovery basis)'.<br><br>**Case 1**: Contractor fails to mobilise the Crane within the mobilisation period of 30 days from the date of intimation by BHEL.<br><br>OR<br><br>**Case 2**: After mobilisation of a particular Crane at site, the work is getting hampered due to non-availability of that Crane for more than 5 days cumulatively in a month.<br><br>**In both the cases, Penalty shall be levied at the rate of 50% X "daily rate*" for total no. of days eligible for penalty.**<br><br>**For Case 1:** Number of days eligible for Penalty = Difference of (date of availability of Crane by Contractor) - (Minus) (30 days from the Date of intimation).<br><br>In above case if bidder fails to mobilize referred T&Ps, BHEL may mobilize the same and in that case aforementioned 'date of availability of 'Crane' shall be reckoned from the date T&P is made available by BHEL.<br><br>**For Case 2:** Number of days eligible for Penalty = (Number of days in a month, in which work is getting hampered, due to non-availability the crane) **–** (Minus) (05 days)<br><br>Daily Rate*= Monthly hire Charge /30. |

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| | NOTE:<br>I) FOR CALCULATION NO. OF DAYS IN A CALENDAR MONTH IS TAKEN AS 30.<br>II) **MONTHLY CRANE CHARGES** AS DERIVED IN THE "Table for Weightages/ Factors and BOQ of Chapter XIV SCHEDULE OF RATES & QUANTITIES".<br>III) Monthly charges shall not be payable for the period of breakdown of crane/ non-availability of crane for any reasons. |
| **4.2.9** | All the T&Ps deployed by the bidders shall have valid test certificates, fitness certificates, registration certificate, insurance etc. The documentary proof shall be submitted to BHEL engineer along with applicable valid certificates. |
| **4.2.10** | Crane log sheet for each of the crane on daily basis is to be certified by the BHEL engineer. Contractor shall submit the monthly running account bills along with duly certified log sheets |
| **4.2.11** | Any or part or all of the T & Ps of the contractor identified for the tendered package shall not be engaged for any works other than that of the works intended in this tender. However, BHEL reserves the rights to engage those T&Ps for which separate monthly rates are being paid as per "TABLE FOR WEIGHTAGES/ FACTORS AND BOQ OF CHAPTER XIV SCHEDULE OF RATES & QUANTITIES" within the project premises for its own works other than that of the works intended in this tender during the period of contract. In such cases fuel will be provided by BHEL. However, operator for the same shall be provided by the contractor. |
| **4.2.12** | During the extended period of contract, services of T&Ps shall be provided by the contractor as per the instruction of BHEL engineer. The monthly charges towards deployment of the particular T&Ps beyond the specified quantity in BOQ shall be paid at the following rate:<br>I. Rate of 90 % of monthly awarded rates upto 25% of BOQ quantity.<br>II. Rate of 85 % of monthly awarded rates upto 50% (beyond 25 %) of BOQ quantity<br>III. Beyond 50% of BOQ quantity, the rate shall be mutually agreed upon |
| **4.2.13** | The wooden sleepers shall be taken back by the contractor on as is where is basis after completion of work. No claim on account of damage /loss shall be payable by BHEL. |
| **4.2.14** | Concrete sleepers shall be arranged by BHEL and shall be issued to Contractor free of cost on returnable basis. It shall be responsibility of bidder to collect the concrete sleepers from the designated places within the plant boundary as intimated by BHEL site. No payment shall be made on account of this. Any damage to concrete sleeper for reasons not attributable to vendor, shall be duly considered during reconciliation. It is to be specifically noted that, concrete sleepers meant for storage yards outside project premises shall also be issued from designated placed inside project premises and contractor shall be responsible for transporting concrete sleepers to outside storage yards within quoted price. |
| **4.2.15** | 25% of wooden sleepers shall be mobilized by the contractor in the first month of contract and balance within 3rd month of contract. |
| **4.2.16** | Quantities of Tarpaulin (fire proof) as indicated in scope of contractor shall be mobilized by the contractor in the first month of contract or as directed by BHEL. Additional quantities shall be supplied by BHEL. |
| **4.2.17** | The Tarpaulin supplied by the contractor shall be taken back by the contractor on as is where is basis after completion of work. No claim on account of damage /loss shall be payable by BHEL. |
| **4.2.18** | Contractor shall ensure that the pressure parts (panels as well as loose tubes) received at site, are covered with plastic caps/plugs at both ends. Contractor shall install such plastic |

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| | caps/plugs for pressure part pipes/tubes/panels. Any requirement of plastic caps/plugs, shall be arranged by BHEL. |
| **4.2.19** | Duration for deployment of T&Ps for which separate monthly hiring rates will be paid AS PER "Table for Weightages/ Factors and BOQ of Chapter XIV SCHEDULE OF RATES & QUANTITIES" is tentative and may change as per requirement. |
| **4.2.20** | Mobilisation and demobilisation of all T&Ps shall strictly be done as per the instructions from BHEL. BHEL also reserves the right to direct the contractor to dis-continue/ de-mobilise any/all of these cranes within the contract period/extended contract period with 30 days (minimum) advance written notice without assigning any reason. No payment shall be made after, 'the notified date of demobilization/discontinuance by BHEL in its notice' or 'the actual date of demobilisation/discontinuance by contractor', whichever is earlier. |
| **4.2.21** | Void |
| **4.2.22** | Void |
| **4.2.23** | Medical/first aid centre/medicine purchased for emergency/doctor purpose along with ambulance services with fuel and operator (round the clock) shall be arranged by BHEL for handling medical emergencies. Cost against these facilities shall be distributed/shared among the vendors working in project Site proportionately based on contract value. |
| **4.2.24** | No payment shall be made for mobilisation and demobilisation of Cranes/ T&Ps, other than for which rate is specifically mentioned in BOQ. |

**5.0 LIST OF T&P TO BE PROVIDED BY BHEL FREE OF HIRE CHARGES ON SHARING BASIS:**

**5.1**

| SN | DESCRIPTION | QUANTITY | REMARKS |
|---|---|---|---|
| 1 | CRAWLER/MOBILE CRANE OF ANY CAPACITY (Above 40 MT). | As per requirement | BASED ON WORK REQUIREMENT BHEL SHALL DEPLOY CRANE OVER AND ABOVE VENDOR DEPLOYED CRANES W.R.T. 4.1.1 OF TCC. |

**5.2**

Note:

1. The cranes may be BHEL owned or may be obtained on hiring basis including operating and maintenance crew.
2. Operator and O&M for BHEL owned crane will be provided by BHEL.
3. Operator and O&M for hired crane will be provided by the hiring agency.
4. Contractor shall provide the fuel for BHEL (Hired/owned) provided cranes for his use.
5. Contractor shall provide necessary manpower assistance for initial and final assembly & dismantling and for subsequent operations of boom extension and reduction during execution of work. Contractor shall also make necessary arrangements like laying of special sleeper beds and steel plates (material shall be provided by BHEL) for movement and operation of the crane.
6. **Above crane will be provided by BHEL for unloading of Major ODC or Heavy consignments where contractor's crane are not capable of doing the mentioned scope of work.**

**5.3**

Cranes provided by BHEL will be on sharing basis with other agencies / contractors of BHEL. The allocation of cranes shall be the discretion of BHEL engineer, which shall be binding on the contractor. Cranes will be deployed at appropriate time as decided by BHEL for suitable duration and intended purpose. Augmentation of BHEL T & P under special circumstances shall be discretion of BHEL.

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| **6.0** | **Time Schedule and Mobilization:** |
| **6.1** | **Initial Mobilization**<br><br>After issue of LOA (though Fax/courier/email) the contractor shall report to the Construction Manager/Site In-Charge of BHEL at site within seven (07) days from date of LOA and submit detailed mobilization plan to start work within 15 days from date of LOA; unless otherwise instructed by BHEL in writing.<br><br>The date of "START OF CONTRACT PERIOD" shall be mutually agreed date between bidder and BHEL engineer in charge. |
| **6.2** | **AUGMENTATION OF MOBILISATION**<br><br>Contractor shall subsequently augment his resources in such a manner that daily errands/activities shall be completed on daily basis and the entire work is completed within the time schedule/contract period**.** Mobilization of contractor's resources shall be made and augmented from time to time in such a manner that the work in scope is carried out in an uninterrupted manner. |
| **6.3** | **CONTRACT PERIOD**<br><br>The contract period for completion of entire work under scope shall be 59 (Fifty-Nine) months from the "START OF CONTRACT PERIOD"**.**<br><br>If work is not completed with-in the contract period, the contract may be extended at the discretion of BHEL. |
| **6.4** | BHEL Engineer shall certify to the contractor the date on which the work is completed and the date thereof for commencement of Guarantee Period for good workmanship and contractor shall rectify free of cost all defects due to faulty work under their scope during the guarantee period. Guarantee Period shall be as given in GCC. |

**7.0** **Terms of Payment:**

**7.1**

WORK OF RECEIPT, UNLOADING, VERIFYING, SHIFTING, STACKING, PRESERVATION, HANDLING AND HANDING OVER OF COMPONENTS OF BOILER WITH AUXILIARIES INCLUDING MILLS & FEEDERS ETC.; ESP WITH AUXILIARIES, STEAM TURBINE & AUXILIARIES; TURBO-GENERATOR & AUXILIARIES; PUMPS WITH AUX., ROTATING MACHINES, TANKS & VESSELS, COMPLETE ELECTRICAL, CONTROLS AND INSTRUMENTATION EQUIPMENTS, PANELS, CABLES / CABLE TRAYS, AND OTHER RELATED ITEMS INCLUDING ITEMS OF BOILER, TG & BOP'S PACKAGES; HP&LP PIPING; REFRACTORY & INSULATION WITH CLADDING MATERIALS; BHEL T&P; COMPONENTS & EQUIPMENT OF VARIOUS OTHER SYSTEMS, PRE-FABRICATED STRUCTURES, STRUCTURAL & REINFORCEMENT STEEL, CEMENT SUPPLY INSTALLATION AND MAINTENANCE OF CCTV CAMERA AND PROVIDING SERVICES FOR MATERIALS MANAGEMENT **AT NLC TALABIRA TPP 3x800MW, (NTTPP), JHARSUGUDA, ODISHA STATE, INDIA.**

| ITEM NO | DESCRIPTION OF ACTIVITY | UNIT | QTY | % BREAK UP |
|---|---|---|---|---|
| ***Section A1*** | | | | |
| *A1.1* | *Material Handling and Material Management for Materials received through Trucks/Trailers at Project Site.* | *MT* | *361493* | *100%* |
| 1 | Unloading, Shifting to Open/Covered Stores. | MT | *361493* | 30% |
| 2 | Updation of Receipt details, in store Material Registers/BHEL MM Package system. | MT | *361493* | 15% |
| 3 | Stacking and Verification. | MT | *361493* | 15% |
| 4 | Updation of Verification details in Material stock registers, Submission of reports as per specified formats for shortage/open delivery, lodging of police reports if required, documents for insurance claims Etc, and preparation of Material Receipt Certificates (MRC) in prescribed formats where ever applicable. | MT | *361493* | 25% |
| 5 | Identification of material in ready to lift position for issue to BHEL/ Erection agency, and updation of issue details in stores Records. | MT | *361493* | 12% |
| 6 | Completion of contractual obligations as Serial No. 7.5 (7.5.1, 7.5.2, 7.5.3 and 7.5.4) | MT | *361493* | 3% |
| | | | | |
| *A1.2* | *Material Handling and Material Management for Materials received through Railway Wagons at Railway Siding/Station/Godown.* | *MT* | *1000* | *100%* |

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| | 1 | Unloading from Railway wagons or collection from godowns, Re-loading, transportation to site and unloading | MT | *1000* | 30% |
| | 2 | Updation of Receipt details, in store Material Registers/BHEL MM Package system | MT | *1000* | 15% |
| | 3 | Stacking and Verification | MT | *1000* | 15% |
| | 4 | Updation of Verification details in Material stock registers, Submission of reports as per specified formats for shortage/open delivery, lodging of police reports if required, documents for insurance claims Etc, and preparation of Material Receipt Certificates (MRC) in prescribed formats where ever applicable | MT | *1000* | 25% |
| | 5 | Identification of material in ready to lift position for issue to BHEL/ Erection agency, and updation of issue details in stores Records | MT | *1000* | 12% |
| | 6 | Completion of contractual obligations as Serial No. 7.5 (7.5.1, 7.5.2, 7.5.3 and 7.5.4) | MT | *1000* | 3% |
| | | | | | |
| | *A1.3* | *Material Handling and Material Management for Materials received at Transporters Godowns within a radius of 50 KM from Project Site* | *MT* | *1000* | *100%* |
| | 1 | Unloading /Collection from Godowns, Re-loading, transportation to site and unloading | MT | *1000* | 30% |
| | 2 | Updation of Receipt details, in store Material Registers/BHEL MM Package system | MT | *1000* | 15% |
| | 3 | Stacking and Verification | MT | *1000* | 15% |
| | 4 | Updation of Verification details in Material stock registers, Submission of reports as per specified formats for shortage/open delivery, lodging of police reports if required, documents for insurance claims Etc, and preparation of Material Receipt Certificates (MRC) in prescribed formats where ever applicable | MT | *1000* | 25% |
| | 5 | Identification of material in ready to lift position for issue to BHEL/ Erection agency, and updation of issue details in stores Records | MT | *1000* | 12% |
| | 6 | Completion of contractual obligations as Serial No. 7.5 (7.5.1, 7.5.2, 7.5.3 and 7.5.4) | MT | *1000* | 3% |
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| | *A1.4* | *Material Handling and Material Management for Structural steel*, Deck sheet, Cladding sheet and Reinforcement steel received through trucks/trailers at project Site* | *MT* | *32195* | *100%* |
| | 1 | Unloading, Shifting to Open/Covered Stores | MT | *32195* | 30% |
| | 2 | Updation of Receipt details, in store Material Registers/BHEL MM Package system | MT | *32195* | 15% |
| | 3 | Stacking and Verification | MT | *32195* | 15% |
| | 4 | Updation of Verification details in Material stock registers, Submission of reports as per specified formats for shortage/open delivery, lodging of police reports if required, documents for insurance claims Etc, and preparation of Material Receipt Certificates (MRC) in prescribed formats where ever applicable | MT | *32195* | 25% |
| | 5 | Identification of material in ready to lift position for issue to BHEL/ Erection agency, and updation of issue details in stores Records | MT | *32195* | 12% |
| | 6 | Completion of contractual obligations as Serial No. 7.5 (7.5.1, 7.5.2, 7.5.3 and 7.5.4) | MT | *32195* | 3% |
| | | | | | |
| | *A1.5* | *Material (other than Cement) re-shifting and re stacking within project premises* | *MT* | *10000* | *100%* |
| | 1 | Material Re-shifting Stacking | MT | *10000* | 85% |
| | 2 | Updation of store material register / BHEL MM package system | MT | *10000* | 12% |
| | 3 | Completion of contractual obligations as Serial No. 7.5 (7.5.1, 7.5.2, 7.5.3 and 7.5.4) | MT | *10000* | 3% |
| | | | | | |
| | *A1.6* | *Despatch/Outgoing materials (other than Cement)* | *MT* | *4000* | *100%* |
| | 1 | Identification of Material, Tagging, Packing if required, Preparation of Gate passes etc. | MT | *4000* | 40% |

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| 2 | Loading of materials, including T&P of BHEL, into trucks/Carriers at site stores/ erection site for onward transportation to other destinations (Transportation by other agencies) | MT | *4000* | 45% |
| 3 | Updation of store material register / BHEL MM package system | MT | *4000* | 12% |
| 4 | Completion of contractual obligations as Serial No. 7.5 (7.5.1, 7.5.2, 7.5.3 and 7.5.4) | MT | *4000* | 3% |
| | | | | |
| ***Section A2*** | | | | |
| *A2.1* | Material Management for:<br>i) Cement received through trucks/trailers in bulkers/bags at project Site (Where unloading of Cement is not in scope of MM agency)<br>ii) Reinforcement Steel / Structural steel (raw) received at project Site (Where unloading of Reinforcement/ Structural steel is done by Civil/ other agency) | MT | *406688* | *100%* |
| 1 | Updation of Receipt details, in store Material Registers/BHEL MM Package system | MT | *406688* | 50% |
| 2 | Verification | MT | *406688* | 20% |
| 3 | Updation of Verification details in Material stock registers, Submission of reports as per specified formats for shortage/open delivery, lodging of police reports if required, documents for insurance claims Etc, and preparation of Material Receipt Certificates (MRC) in prescribed formats where ever applicable | MT | *406688* | 27% |
| 4 | Completion of contractual obligations as Serial No. 7.5 (7.5.1, 7.5.2, 7.5.3 and 7.5.4) | MT | *406688* | 3% |
| | | | | |
| ***Section A2.1(a)*** | | | | |
| *A2.1(a)* | *Material Handling and Material Management for Cement received through trucks/trailers in **bags** at project Site* | *MT* | *1000* | *100%* |
| 1 | Unloading, Shifting to Covered Stores | *MT* | *1000* | *30%* |

| | | | | |
|---|---|---|---|---|
| 2 | Updation of Receipt details, in store Material Registers/BHEL MM Package system | MT | *1000* | 15% |
| 3 | Stacking and Verification | MT | *1000* | 15% |
| 4 | Updation of Verification details in Material stock registers, Submission of reports as per specified formats for shortage/open delivery, lodging of police reports if required, documents for insurance claims Etc, and preparation of Material Receipt Certificates (MRC) in prescribed formats where ever applicable | MT | *1000* | 25% |
| 5 | Identification of material in ready to lift position for issue to BHEL/ Erection agency, and updation of issue details in stores Records | MT | *1000* | 12% |
| 6 | Completion of contractual obligations as Serial No. 7.5 (7.5.1, 7.5.2, 7.5.3 and 7.5.4) | MT | *1000* | 3% |
| | | | | |
| ***A2.2*** | ***Material re-shifting and re-stacking for Cement within project premises*** | ***MT*** | ***500*** | ***100%*** |
| 1 | Material Re-shifting Stacking | MT | *500* | 85% |
| 2 | Updation of store material register / BHEL MM package system | MT | *500* | 12% |
| 3 | Completion of contractual obligations as Serial No. 7.5 (7.5.1, 7.5.2, 7.5.3 and 7.5.4) | MT | *500* | 3% |
| | | | | |
| ***A2.3*** | ***Despatch/Outgoing for Cement bag materials*** | ***MT*** | ***100*** | ***100%*** |
| 1 | Identification of Material, Tagging, packing if required, Preparation of Gate passes etc. | MT | *100* | 40% |
| 2 | Loading of Cement bags/materials into trucks/Carriers at site stores/ erection site for onward transportation to other destinations (Transportation by other agencies) | MT | *100* | 45% |
| 3 | Updation of store material register / BHEL MM package system | MT | *100* | 12% |
| 4 | Completion of contractual obligations as Serial No. 7.5 (7.5.1, 7.5.2, 7.5.3 and 7.5.4) | MT | *100* | 3% |
| | | | | |
| ***Section A.3*** | ***Operation and maintenance of weighbridge*** | ***Unit*** | ***Duration*** | |

| | | | |
|---|---|---|---|
| ***A.3.1*** | For 100 MT capacity | ***Months*** | 112 |

| **Section B: Cranes** | | | |
|---|---|---|---|
| **SN** | **Crane description** | **Unit** | **Duration** |
| *B.1* | *Pick and Carry Crane 14/17 MT (in Months)* | Months | 110 |
| *B.2* | *Pick and Carry Crane 23 MT (In Months)* | Months | 52 |
| *B.3* | *Pick & Carry Crane 40 MT (In Months)* | Months | 50 |
| *B.4* | *Forklift 5 Ton capacity with 3M lift (In Months)* | Months | 28 |
| *B.5* | (a) 75MT/80 MT Basic Capacity Tyre Mounted Crane | Months | 32 |
| | *(b) One Time Mobilisation and Demobilisation charges of above mentioned 75MT/ 80MT Crane* | 1 LOT | One Time |

| **Section C:** ***Menial and Secretarial Services (Unit Rate Fixed as per minimum wages circular)*** | | | | | |
|---|---|---|---|---|---|
| **SN** | ***Description*** | **Unit** | **Duration** | ***Unit Rate#*** | ***Total Amount (In Rs)*** |
| *C.1* | *Menial Services (unskilled)* | Man-Months | 448 | ₹ 19,833 | ₹ 8,885,184.00 |
| *C.2* | *Secretarial Services (Skilled)* | Man-Months | 560 | ₹ 27,862 | ₹ 15,602,720.00 |
| *C.3* | *Menial Services (Unskilled) - for Grass cutting* | Man Months | 100 | ₹ 19,833 | ₹ 1,983,300.00 |

| **ITEM NO** | **DESCRIPTION OF ACTIVITY** | **UNIT** | **QTY** | **% BREAK UP** |
|---|---|---|---|---|
| ***Section D: Supply and installation of CCTV system for storage space*** | | | | |
| ***D.1*** | ***Supply and Installation of all hardware and software of the IP based PTZ dome camera along with p2p/PMP Outdoor CPE Antenna for wireless communication surveillance system including for storage space.*** | **Nos.** | **8** | ***100*** |
| 1 | Completion of supply of all hardware required for the entire contract and acceptance by BHEL official | Nos. | 8 | 70% |
| 2 | Completion of installation of the entire CCTV system including display unit with demonstration to BHEL | Nos. | 8 | 30% |
| ***D.2*** | ***Supply and Installation of all hardware and software of the IP based Fixed bullet camera along with p2p/PMP Outdoor CPE Antenna for wireless communication surveillance system including for storage space.*** | ***Nos.*** | ***60*** | ***100%*** |

| | | | | | |
|---|---|---|---|---|---|
| | 1 | Completion of supply of all hardware required for the entire contract and acceptance by BHEL official | Nos. | 60 | 70% |
| | 2 | Completion of installation of the entire CCTV system including display unit with demonstration to BHEL | Nos. | 60 | 30% |
| | ***D.3*** | ***Supply and Installation of LED Display Screen – Min. 50" with integration capabilities with CCTV system*** | ***Nos.*** | ***2*** | ***100%*** |
| | 1 | Completion of supply of all hardware required for the entire contract and acceptance by BHEL official | Nos. | 2 | 70% |
| | 2 | Completion of installation of the entire CCTV system including display unit with demonstration to BHEL | Nos. | 2 | 30% |
| | ***Section E: Comprehensive maintenance of the CCTV system for storage space*** | | | | |
| | ***E.1*** | ***Comprehensive maintenance of the CCTV system*** | ***Months*** | ***56*** | ***100%*** |

Note: The quantities mentioned above are tentative in nature and may vary to any extent.

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| **7.2** | ***Structural Steel* -*** Payment terms for materials supplied by BHEL Manufacturing Unit & Shop Fabricated Structure shall be covered under Item no A1.1 whereas Item A1.4. shall be applicable for supplies of material other than BHEL Manufacturing Units/ Shop fabricated Structure. |
| **7.3** | During loading of material which are issued to erection agencies, it shall be responsibility of erection agency to put back/ re-stack the balance materials in case stack is disorganized while taking materials. In case the same is not done by the erection agency, it shall be responsibility of MM agency to re-stack the material with due intimation to BHEL in writing with possible evidence or on direction of BHEL Engineer. In such cases, the cost of restacking shall be governed by clause no.7.1, Sl. no. A1.5 & A2.2 respectively. However, since re-shifting shall not be involved in these cases so, 50% of A1.5 (1) & 100% of A1.5 (3) shall only be payable. A1.5 (2) shall not be considered payable. Similar methodology for payment shall be applicable for cases under A2.2.<br><br>However, on BHEL inspection if it is found that the materials are lying disorganised/ unstacked and the same has not been reported by MM agency due to negligence, then in that case the MM agency shall restack the material at their own cost. |
| **7.4** | Void |

**7.5**

7.5 Other payment terms & condition

| | | |
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| 7.5 | **OTHER** payment terms & condition | |
| | **% from every RA Bill to be paid only after satisfactory completion otherwise forfeited** | |
| 7.5.1 | HOUSEKEEPING & CLEANING OF ALL CLOSED SHEDS | 1% |
| 7.5.2 | PRESERVATION PLANNED FOR THE MONTH | 0.5% |
| 7.5.3 | Safe working at the place of work | 0.5% |
| 7.5.4 | Implementation of E-stores for records/data | 1% |
| | TOTAL | 3% |

Note: The aforementioned payment of 3% is within the 100% payment as mentioned in clause 7.1 above.

**7.6**

**Cranes (For Section B)**

Payment for Cranes shall be made on monthly basis on actual deployment basis as per the awarded monthly rate against each crane. For "75MT/80 MT Basic Capacity Tyre Mounted Crane", *One Time Mobilisation and Demobilisation charges shall be paid.* Payment towards mobilization and de-mobilisation of 75MT/80 MT crane shall be made in the manner as specified below**:**

(a) First 50% of the specified amount for mobilization and demobilization will be paid after deployment of the crane complete in all respects including all assemblies, sub–assemblies, accessories & components, assembly of crane as required by BHEL and BHEL's acceptance of load test of assembled crane at site.

(b) Remaining 50% of the specified amount for mobilization and demobilization will be paid after demobilization of the crane from the project site and clearing the site premises in all respect pertaining to the T&P. Cost of demobilisation shall however not be paid if crane is made to be demobilised due to its in-effectiveness or termination of contract etc

No other payment shall be paid for the other T & Ps deployed for carrying out the work as per the scope of this tender. Price variation compensation and Overrun compensation will not be applicable for items in Sec-B. One Month for Section-B shall be 30 days of working.

**7.7**

**Menial, Secretarial & Grass Cutting Services: (For Section C)#**

Payment for Menial, Secretarial & Grass Cutting Services shall be made on monthly basis on actual deployment as per the awarded monthly rate against each head. These services may be used for BHEL Offices, stores, site offices, establishments etc. as decided by BHEL.

Payment for the same shall be made as per the service-month rate fixed in item no C.1 to C.3 of rate schedule Section -C Terms of Payment, on pro-rata basis as at actuals.

The actual requirement of manpower shall be discussed and finalized with engineer in-charge before start of the works.

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| | Presently, rates fixed are on the basis of total minimum wages circular dated 25-09-2025 by GOI and the same shall be revised at times when it is changed by the Government / NLC. As such, during execution of the job the rates against Menial and secretarial services shall be regulated as per applicable wages circular issued by Customer from time to time.<br><br>Therefore, Price variation compensation and Overrun compensation will not be applicable for items in Sec-C.<br>Payment against items in Section C of Chapter-XIV Schedule of Rates and Quantities shall be calculated & paid in following manner;<br>• Per service month rate (for Unskilled Services) = Factor (G) x minimum wages per month (rounded to next higher fifty value)<br>• Per service month rate (for Skilled Services) = Factor (G) x minimum wages per month (rounded to next higher fifty value)<br><br>Minimum wages per month = Daily Rate Minimum Wage per day (rounded value) x 26 Days.<br><br>In case the monthly minimum wage (considering 26 days in a month) is less than Rs.21,000/- (or the limit as per extant guideline) the Factor (G) shall be 1.41, however, if the monthly minimum wage (considering 26 days in a month) is equal to or more than Rs. 21,000/- (or the limit as per extant guideline) the Factor (G) shall be reduced by 0.12 (For non-applicability of ESI – 0.036 & for non-applicability of Bonus – 0.084), Accordingly the Factor (G) shall be 1.29.<br><br>Factor (G), for Unskilled Manpower and Skilled Manpower has been calculated taking in to account applicable statutory benefits such as PF, ESI, Bonus, Uniform, Leave pay, Overhead & Profit. In case of any change in wages/ guidelines, extant applicable guidelines shall be followed while calculating the factors (G).<br><br>During the extended period of contract, above services, for BHEL office and stores, site offices, establishments etc. shall be provided by the contractor as per the instruction of BHEL site-in-charge. Rates during extended period shall be followed as above.<br><br>Note: BHEL at its sole discretion reserves the right to re-shuffle the work allocation of the personnel deployed for menial and secretarial services.<br><br>In case the contractor does not deploy or delays deployment of above said manpower with reference to specific instructions from BHEL, BHEL will levy penalty for delay in the following manner:<br><br>A. Supervision/secretarial services @ Rs100 per service-day.<br><br>B. Menial services for BHEL office and stores etc. @ Rs 100 per service-day.<br><br>C. Menial services for Grass Cutting @ Rs 100 per service-day. |
| 7.8 | ***Section A.3-Operation and maintenance of weighbridge*** |

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| | It may be noted that BHEL shall install 02 nos. of Weighbridges of 100MT. Payment for Operation and maintenance of weighbridges shall be made on monthly basis on actuals as per the awarded monthly rate.<br>BHEL shall install and calibrate the weighbridge (one time only) and spares of all major repairs shall be in BHEL scope. Further, Preventive maintenance, further calibration and manpower for repairs shall be in Contractor's scope. Contractor shall provide One Computer Operator/ Supervisor in control room for each weighbridge for two shifts (i.e. one for Morning and other for evening). |
| 7.9 | **Supply and installation of CCTV system (For Section -D)**<br><br>The supply and installation of entire component of the CCTV system shall be completed within the Three month from the date of intimation by BHEL construction Manager /EIC (refer Chapter XIII for detail). CCTV system shall include all the necessary hardware and software required for the cameras as mentioned **in clause no. 2.2.18 and Chapter XIII or elsewhere in TCC.** Price variation compensation and Overrun compensation will not be applicable for items in Sec-D. |
| 7.10 | **Comprehensive maintenance of CCTV system (For Section -E)**<br>Price variation compensation and Overrun compensation will not be applicable for items in Sec-E. |
| 7.11 | **Progressive Payment/ Final Payment:** The payments for works under the scope of this contract shall be as per Clause 16.10 of TCC and clause no 2.6; 2.22; 2.23 of General Conditions of Contract. *All documents like HR Clearance, Quality and Safety Compliances, etc. required for processing the RA Bills should be submitted along with RA Bills.* |
| 7.11.1 | **<u>Documents required for RA Bill:</u>**<br><br>GST Complied Invoice of the work done as per approved BBU.<br>WAM -6 for RA Bill.<br>Jointly signed Measurement sheet.<br>Power of Attorney before submission of Bill.<br>Validity of Bank Guarantees as applicable under the contract.<br><br>**HR/IR compliance documents:**<br>i. Wages payment sheet as per applicable minimum wages.<br>ii. Proof of PF contribution submission.<br>iii. Proof of ESI/ WC contribution submission<br>iv. Proof of Bonus payment as per Bonus Act if applicable.<br>v. Proof of EL payment if applicable.<br>vi. Any other statutory document if applicable. |
| 7.11.2 | **<u>Documents required for Final Bill:</u>**<br><br>The final bill is drawn as soon as the entire work is completed. From the final amount due, all amounts already claimed up to the previous running account bill will be deducted. It should be ensured that in the final bill the following additional particulars have been provided:<br><br>· Final Bill in WAM-7 Format.<br>· 'No claim' certificate from the contractor. |

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| | · Clearance certificates where ever applicable viz. Clearance Certificates from Customer, various Statutory Authorities like Labour department, PF Authorities, Commercial Tax department etc.<br>· Final Material re-conciliation statement duly approved by BHEL.<br>· Indemnity Bond as per prescribed format.<br>· Deviation statement showing the difference between the actuals and as per the contract.<br>· Final Delay Analysis. |
| 7.12 | **SECURED RECOVERABLE ADVANCES:**<br>**Interest Free Secured Mobilization Advance as per GCC Clause No.2.13.1:** Interest Free Mobilization Advance shall be disbursed in following mentioned stages of major resource mobilization as specified hereunder:<br>1. For Mobilization and installation of Site Infrastructure by contractor i.e. site office, stores etc-1%<br>2. For Mobilization of 75/80 MT Crane and 40MT Crane at site to start the work - 2%<br>3. For Mobilization of other required T&Ps, resources and consumables - 2%<br>Note:<br>1. BHEL Site-CM shall be the certifying authority for assessing the admissibility of advance to contractor. |

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| 8.0 | **TAXES & DUTIES** |
| 8.1 | The contractor shall pay all (save the specific exclusions as enumerated in this clause) taxes, fees, license, charges, deposits, duties, tools, royalty, commissions, other charges, etc. which may be levied on the input goods & services consumed and output goods & services delivered in course of his operations in executing the contract. In case BHEL is forced to pay any of such taxes/duties, BHEL shall have the right to recover the same from his bills or otherwise as deemed fit.<br><br>However, provisions regarding GST on output supply (goods/service) and TDS/TCS as per Income Tax Act shall be as per following clauses. |
| 8.2 | **GST (Goods and Services Tax)** |
| 8.2.1 | GST as applicable on output supply (goods/services) are excluded from contractor's scope; therefore, contractor's price/rates shall be exclusive of GST**.** Reimbursement of GST is subject to compliance of following terms and conditions. BHEL shall have the right to deny payment of GST and to recover any loss to BHEL on account of tax, interest, penalty etc. for non-compliance of any of the following condition. |
| 8.2.2 | The admissibility of GST, taxes and duties referred in this chapter or elsewhere in the contract shall be limited to direct transactions between BHEL & its Contractor. BHEL shall not consider GST on any transaction other than the direct transaction between BHEL & its Contractor. |
| 8.2.3 | Contractor shall obtain prior written consent of BHEL before billing the amount towards such taxes. Where the GST laws permit more than one option or methodology for discharging the liability of tax/levy/duty, BHEL shall have the right to adopt the appropriate one considering the amount of tax liability on BHEL/Client as well as procedural simplicity with regard to assessment of the liability. The option chosen by BHEL shall be binding on the Contractor for discharging the obligation of BHEL in respect of the tax liability to the Contractor. |
| 8.2.4 | Contractor has to submit GST registration certificate of the concerned state. Contractor also needs to ensure that the submitted GST registration certificate should be in active status during the entire contract period. |
| 8.2.5 | Contractor/Vendor has to issue Invoice/Debit Note/Credit Note indicating HSN/SAC code, Description, Value, Rate, applicable tax and other particulars in compliance with the provisions of relevant GST Act and Rules made thereunder. |
| 8.2.6 | Vendor has to submit GST compliant invoice within the due date of invoice as per GST Law. In case of delay, BHEL reserves the right of denial of GST payment if there occurs any hardship to BHEL in claiming the input thereof. In case of goods, vendor has to provide scan copy of invoice & GR/LR/RR to BHEL before movement of goods starts to enable BHEL to meet its GST related compliances. Special care should be taken in case of month end transactions. |
| 8.2.7 | Vendor has to ensure that invoice in respect of such services which have been provided/completed on or before end of the month should not bear the date later than last working day of the month in which services are performed. |
| 8.2.8 | Subject to other provisions of the contract, GST amount claimed in the invoice shall be released on fulfilment of all the following conditions by the Contractor: -<br>a. Supply of goods and/or services have been received by BHEL.<br>b. Original Tax Invoice has been submitted to BHEL.<br>c. Contractor/ Vendor has submitted all the documents required for processing of bill as per contract/ purchase order/ work order.<br>d. In cases where e-invoicing provision is applicable, vendor/contractor is required to submit invoice in compliance with e-invoicing provisions of GST Act and Rules made thereunder. |

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| | e. Contractor has filed all the relevant GST return (e.g. GSTR-1, GSTR-3B, etc.) pertaining to the invoice submitted and submit the proof of such return along with immediate subsequent invoice. In case of final invoice/ bill, contractor has to submit proof of such return within fifteen days from the due date of relevant return.<br>f. Respective invoice has appeared in BHEL's GSTR – 2A for the month corresponding to the month of invoice and in GSTR-2B of the month in which such invoices has been reported by the contractor along with status of ITC availability as "YES" in GSTR-2B. Alternatively, BG of appropriate value may be furnished which shall be valid at least one month beyond the due date of confirmation of relevant payment of GST on GSTN portal or sufficient security is available to adjust the financial impact in case of any default by the contractor.<br>g. Contractor has to submit an undertaking confirming the payment of all due GST in respect of invoices pertaining to BHEL. |
| 8.2.9 | Any financial loss arises to BHEL on account of failure or delay in submission of any document as per contract/purchase order/work order at the time of submission of Tax invoice to BHEL, shall be deducted from contractor's bill or otherwise as deemed fit. |
| 8.2.10 | TDS as applicable under GST law shall be deducted from contractor's bill. |
| 8.2.11 | Contractor shall comply with the provisions of e-way bill wherever applicable. Further wherever provisions of GST Act permits, all the e-way bills, road permits etc. required for transportation of goods needs to be arranged by the contractor. |
| 8.2.12 | Contractor shall be solely responsible for discharging his GST liability according to the provisions of GST Law and BHEL will not entertain any claim of GST/interest/penalty or any other liability on account of failure of contractor in complying the provisions of GST Law or discharging the GST liability in a manner laid down thereunder. |
| 8.2.13 | In case declaration of any invoice is delayed by the vendor in his GST return or any invoice is subsequently amended/altered/deleted on GSTN portal which results in any adverse financial implication on BHEL, the financial impact thereof including interest/penalty shall be recovered from the Contactor's due payment. |
| 8.2.14 | Any denial of input credit to BHEL or arising of any tax liability on BHEL due to non-compliance of GST Law by the Contractor in any manner, will be recovered along with liability on account of interest and penalty (if any) from the payments due to the Contactor. |
| 8.2.15 | In the event of any ambiguity in GST law with respect to availability of input credit of GST charged on the invoice raised by the contractor or with respect to any other matter having impact on BHEL, BHEL's decision shall be final and binding on the contractor. |
| 8.2.16 | **Variation in Taxes & Duties:**<br>Any upward variation in GST shall be considered for reimbursement provided supply of goods and services are made within schedule date stipulated in the contract or approved extended schedule for the reason solely attributable to BHEL. However downward variation shall be subject to adjustment as per actual GST applicability.<br>In case the Government imposes any new levy/tax on the output service/goods after price bid opening, the same shall be reimbursed by BHEL at actual. The reimbursement under this clause is restricted to the direct transaction between BHEL and its contactor only and within the contractual delivery period only.<br>In case any new tax/levy/duty etc. becomes applicable after the date of Bidder's offer but before opening of the price Bid, the Bidder/Contractor must convey its impact on his price duly substantiated by documentary evidence in support of the same before opening of price bid. Claim |

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| | for any such impact after opening the price bid will not be considered by BHEL for reimbursement of tax or reassessment of offer. |
| 8.3 | **Income Tax:**<br>**TDS/TCS** as applicable under Income Tax Act, 1961 or rules made thereunder shall be deducted/collected from contractor's bill**.** |

**8.4 BOCW Act & Cess Act**

**8.4.1 BOCW Cess is not to be borne by contractor.** Refer Annexure-I for BOCW Act & Cess Act.

| | **Annexure-I:** |
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| Bidder may please note that the sub-contractor/bidder of BHEL engaging building or construction worker in connection with building or other construction work, are required to follow the procedures enumerated below: | |
| 1. | It shall be the sole responsibility of the contractor as employer to ensure compliance of all the statutory obligations under the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 and the Building and other Construction Workers' Welfare Cess Act, 1996 and the rules made thereunder**.** |
| 2. | It shall be sole responsibility of the contractor engaging Building Workers in connection with the building or other construction works in the capacity of employer to apply and obtain registration certificate specifying the scope of work under the relevant provisions of the Building and Other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 from the appropriate Authorities. |
| 3. | It shall be responsibility of the contractor to furnish a copy of such Registration Certificate within a period of one month from the date of commencement of Work. |
| 4. | It is responsibility of the contractor to register under the Building and other Construction Workers' Welfare Cess Act, 1996 and deposit the required Cess for the purposes of the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 at such rate as the Central Government may, by notification in the Official Gazette, from time to time specify. However, before registering and deposit of Cess under the Building and other Construction Workers' Welfare Cess Act, 1996, the contractor will seek written prior approval from the Construction Manager. |
| 5. | It shall be sole responsibility of the contractor as employer to get registered every Building Worker, who is between the age of 18 to 60 years of age and who has been engaged in any building or other construction work for not less than ninety days during the preceding twelve months as Beneficiary under the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996. |
| 6. | It shall be sole responsibility of the contractor as employer to maintain all the registers, records, notices and submit returns under the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 and the Building and other Construction Workers' Welfare Cess Act, 1996 and the rules made thereunder**.** |

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| 7. | It shall be sole responsibility of the contractor as employer to provide notice of poisoning or occupation notifiable diseases, to report of accident and dangerous occurrences to the concerned authorities under the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 and the rules made thereunder and to make payment of all statutory payments & compensation under the Employees' Compensation Act, 1923**.** |
| 8. | It shall be the responsibility of the sub-contractor as employer to make payment/deposit of applicable cess amount on the extent of work involving building or construction workers engaged by the sub-contractor within a period of one month from the receipt of payment. It shall also be responsibility of the Contractor to furnish BHEL on monthly basis, Receipts/ Challans towards Deposit of the Cess under the Building and other Construction Workers' Welfare Cess Act, 1996 and the rules made thereunder along with following statistics:<br>(i)Number of Building Workers employed during preceding one month.<br>(ii) Number of Building workers registered as Beneficiary during preceding one month.<br>(iii)Disbursement of Wages made to the Building Workers for preceding wage month.<br>(iv) Remittance of Contribution of Beneficiaries made during the preceding month |
| 9. | **BHEL shall reimburse the contractor the Cess amount deposited for the purposes of the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 under the Building and other Construction Workers' Welfare Cess Act, 1996 and the rules made thereunder.**<br>However, BHEL shall not reimburse the Fee paid towards the registration of establishment, fees paid towards registration of Beneficiaries and Contribution of Beneficiaries remitted. |
| 10. | It shall be responsibility of the Building Worker engaged by the Contractor and registered as a beneficiary under the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 to contribute to the Fund at such rate per mensem as may be specified by the State government by notification in the Official Gazette. Where such beneficiary authorizes the contractor being his employer to deduct his contribution from his monthly wages and to remit the same, the contractor shall remit such contribution to the Building and other construction Workers' Welfare Board in such manner as may be directed by the Board , within the fifteen days from such deduction. |
| 11. | **Bidders may please note that though the quoted price is exclusive of BOCW (which will be reimbursed by BHEL as per sub-clause 9 above) , however, If at any point of time during the contract period, non-compliance of the provisions of the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 and the Building and other Construction Workers' Welfare Cess Act, 1996 and the rules made thereunder is observed, BHEL reserves the right to deduct the applicable cess (1%) on the contract value and penalty ( if any, imposed by Cess Authorities) from the payables on account of non-compliance.** |
| 12. | The contractor shall declare to undertake any liability or claim arising out of employment of building workers and shall indemnify BHEL from all consequences / liabilities / penalties in case of non-compliance of the provisions of the Building and other Construction Workers' (Regulation |

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| | of Employment and Conditions of Service) Act, 1996 and the Building and other Construction Workers' Welfare Cess Act, 1996 and the rules made thereunder. |

<table>
<tr><td>9.0</td><td>MATERIAL HANDLING & MATERIAL MANAGEMENT OF MATERIAL RECEIVED BY ROAD</td></tr>
<tr><td>9.1</td><td>Majority of consignments shall reach site directly for delivery. However, a good number of consignments shall be booked on Godown delivery basis or door delivery against consignee copy basis, the procedure of material collection shall be adopted as detailed in relevant chapter.</td></tr>
<tr><td>9.2</td><td>It will be responsibility of the contractor to keep in touch with officials of BHEL regarding advance information about arrival of consignments. The contractor shall collect lorry way bills or other such dispatch documents.</td></tr>
<tr><td>9.3</td><td>The contractor shall remain in regular contact with the concerned transporters or based on the dispatch details obtained as stated above and make all necessary arrangements for collection / receipt of the consignment as applicable. Contractor shall take advance action to deploy all necessary resources for local transportation, handling and unloading of the anticipated consignments so as to ensure no loss of time upon arrival of the consignments</td></tr>
<tr><td>9.4</td><td>Payment of demurrage/ wharfage etc., which result due to contractor’s fault, shall be the responsibility of contractor and to his account. If BHEL has to make payment of such demurrage/ wharfage together with freight (payment of freight alone is in BHEL scope), the amounts so paid as demurrage/wharfage for the reasons stated above shall be paid to BHEL by the contractor forthwith or shall be recovered from the bill payments due to the contractor.<br>If it is found that handling and unloading of the consignment are delayed deliberately by contractor (i.e. delay is fully attributable to contactor), which may result in to long queuing of Lorries, penalty shall be imposed as per following:<br><br>
<table>
<tr><th>No. of Days of Deliberate Delay</th><th>Rate of penalty in each case</th></tr>
<tr><td>03 to 05 days</td><td>@Rs. 500 per day per truck/ lorry/ trailer</td></tr>
<tr><td>06 to 10 days</td><td>@Rs. 1000 per day per truck/ lorry/ trailer</td></tr>
<tr><td>More than 10 days</td><td>@Rs. 2000 per day per truck/ lorry/ trailer</td></tr>
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</td></tr>
<tr><td>9.5</td><td>It would be the responsibility of the contractor to examine the packages, consignments etc. Immediately on arrival and bring to the notice of BHEL authorities regarding loss/damage/shortage/discrepancy, if any, observed in the consignments before taking delivery of the same</td></tr>
<tr><td>9.6</td><td>Any discrepancy/shortage/damage found in the consignment after taking clean delivery from the carriers shall be the responsibility of contractor and the resultant loss to BHEL on such account shall be recoverable from the contractor due to negligence/ carelessness on the part of the contractor.</td></tr>
<tr><td>9.7</td><td>Consignments are expected to arrive during any time of the day, and count down for detention/demmurage/wharfage charges is liable to start immediately. Unloading of such consignments may be necessitated even in the night or round the clock. Contractor shall arrange to deploy his resources immediately and continue round the clock on such occasions without any additional cost to BHEL. Contractor shall arrange all necessary resources including spot lighting for working at night. The contractor shall similarly unload consignments arriving on weekly off days and holidays.</td></tr>
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| **9.8** | Unloading at storage area/work site, stacking and restacking if necessity arises, of all materials including heavy/sophisticated equipments like tubed wall panels of boiler, heavy motors, heavy bearing pedestals, electrical panels and TG equipment like heavy turbine components, pumps, panels, etc. Shall be done as per storage and preservation manual of relevant equipment/components of BHEL and/or as per directions of BHEL engineer. |
| **9.9** | The contractor shall verify the consignments in detail **within 12 days of receipt and report the discrepancies in prescribed formats not later than 14th day**. Any loss on account of delayed reporting shall be recoverable from contractor's bill/any payment due. Contractor shall arrange all facilities to open packages – where required in the presence of BHEL engineer, verify the contents, repack wherever and whenever called for and properly stack them as per storage manual or/and as may be directed by BHEL. |
| **9.10** | The material shall be so stacked that it should facilitate easy identification, retrieval and handling for issue as and when need arises. |
| **9.11** | Pre-defined identification system of the locations of open storage yard, semi-closed shed, covered stores as well as storage racks has to be designed/prepared by the contractor with the approval of BHEL. Contractor shall put up prominent identification boards of segmental locations (for open and closed stores) or inscription (on the storage racks) with clear visibility from a distance. Contractor shall also arrange to display plot plan at regular intervals in the covered/semi-closed/open storage. The contractor shall arrange proper displays/signs for various requirements as per instructions of BHEL<br><br>The display boards shall be made with structural steel & M.S. plates and shall be painted with synthetic enamel paint. Contractor shall have to periodically repeat such exercise as the original displays may get lost / damaged / deteriorate with time. All materials and consumables for this purpose shall be arranged by the contractor. Contractor shall have to make his own arrangements including supply of materials for displaying the proper identification tags, boards, marking, inscription etc. As scope of work. |
| **9.12** | The contractor shall execute the work in a professional manner. The stores shall be handled with due care and diligence. The contractor at his own cost shall make good, any loss to BHEL due to contractor's lapse**.** |
| **9.13** | For all consignments, observations regarding loss/damage/shortage/ discrepancy is to be recorded in appropriate document and informed to BHEL. In case it becomes necessary to take **'OPEN DELIVERY'** from the authorities, contractor shall make all arrangements for taking open deliveries. All expenses connected therewith shall be to the account of contractor. Any loss that accrues to BHEL on account of such failures shall be debited to the contractor and recovery effected from his running bills. |
| **9.14** | **HANDLING HEAVIER CONSIGNMENTS:**<br><br>Contractor shall submit procedure with sketches of handling of all heavy components to BHEL well in advance and obtain prior approval before unloading and stacking. |

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| **9.15** | Since this contract is intended to be a complete package from material receipt through issue/transactions right up to material reconciliation, full responsibility w.r.t the proper upkeep of facilities e.g. computers, stationary items; ensuring befitting discipline among the store assistants/staff under its control and accounting of materials on stock shall rest with the contractor at all times.<br><br>In the remote possibility of any untraceable material, customarily BHEL has to process the insurance claim. To kick off such claim, the contractor shall render all necessary assistance including augmentation of documents (FIR etc) within the quoted price as may be required for realization of the insurance claim. |
| **9.16** | The contractor under this contract shall complete induction of following categories of resources within the quoted item rates, to ensure establishment of proper **materials management** at the project site |
| **9.16.1** | Computers and printers with latest up-gradation, memory and compatible with BHEL computers/LAN equipment to be installed/used within BHEL site office – Computer – 06 sets and Printer cum Scanner – 02 sets, Photocopier machine 1 No. & Hard disk of 2TB or above – 02 no (for monthly backup of records).<br>Computers and printers are envisaged for various Material Management activities such as record keeping/data entry done by bidder's staff.<br><br>These resources (i.e. computer/ printer cum scanner/ photocopier machine/ hard disk/ cartridges for printer & photocopier machine) shall be maintained by contractor and remain contractor's property/ownership for all legal/technical purposes. The resources as mentioned above shall remain at BHEL offices during the contract period/ extended period (if any). These shall be taken back by the contractor after completion of job or when requirement is over, as certified by BHEL Engineer, whichever is earlier.<br><br>This facility has to be provided as directed by BHEL till completion of job or as decided by BHEL, as mentioned above. If contractor fails to provide mentioned resources as per requirement, for a continuous period of fifteen days or more, BHEL shall have the right to purchase it on behalf of contractor and recover the expenses incurred from the dues payable to contractor. Recoveries shall be actual expenses incurred plus 5% overheads.<br><br>**NOTE**: The contractor shall provide above resources for carrying out functions/operations as stated above. The no. of resources indicated above is tentative and actual deployment may vary based on work load and site requirement. **The requirement schedule shall be finalized in the beginning of the contract period/extension period with Engineer In-charge**. Contractor shall ensure availability of resources during extension period as well. This does not absolve the contractor from his responsibility towards the satisfactory execution of the job. |

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| **9.16.2** | Item rate obtained in the "**TABLE FOR WEIGHTAGES/ FACTORS AND BOQ OF CHAPTER XIV SCHEDULE OF RATES & QUANTITIES**" has specific mention of "materials management" with sole purpose to emphasize the requirement of sufficient no. Of adequately qualified manpower to ensure best obtainable quality of work. Accordingly, supervisors/manpower (apart from workmen on cranes and material handling purpose) as indicated against each activity in the table below, normally to work at (but not limited to) BHEL site office |
| **9.16.3** | Contractor shall ensure availability of sufficient manpower, supervisor and T&Ps to execute the awarded work, to meet the site requirements. During peak stage no. of vehicle, pending for unloading, may go up to 80 nos. or above Per day. |
| **9.17** | **RESPONSIBILITIES OF THE CONTRACTOR –** |
| **9.17.1** | **RECEIPT & ISSUE**<br>Scope includes execution of various activities as follows: |
| **9.17.1.1** | Receipt, unloading, carrying out receipt inspection, detailed verification, stacking and regular stock verification of materials at site. |
| **9.17.1.2** | Preparing various reports at appropriate stages and reporting damage/loss during receipt as well as storage and any other associated responsibility as assigned by BHEL from time to time. Responsibility shall include the following activities:<br>i. Examination of incoming consignments to detect any loss or shortage or outward damage and recording it on the LR/LWB before making acknowledgement of it's receipt from the transporter and simultaneously obtaining endorsement of the vehicle driver on the same.<br>**ii.** Reporting such discrepancy to BHEL immediately on receipt of the consignment.<br>**iii.** Assisting BHEL in lodging insurance claims in respect of loss/damage as stated above.<br>iv. The Contractor shall actively assist and expedite the process of obtaining Material Receipt Certificates (MRCs) from the End Customer, in timely manner. Any delay in the submission/verification of the MRCs shall entitle BHEL to initiate appropriate contractual remedies as deemed necessary. |
| **9.17.1.3** | Issue of materials to BHEL's erection contractors, preservation of stacked materials, re-stacking/re-handling as necessary, progressive and final reconciliation with BHEL's erection agencies and preparation of necessary document/ record in respect of these activities. |
| **9.17.1.4** | Return of excess/defective materials by various erection contractors of BHEL |
| **9.17.1.5** | LOADING AND DISPATCH OF OUTGOING MATERIALS. |
| **9.17.1.6** | EXPECTED MINIMUM QUALITY OF SERVICE<br><br>Contractor shall render the services by ensuring deployment of requisite personnel with adequate educational qualification having thorough experience in related field to enable |

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| | understanding the intricacies of and special requirements involved in handling of project materials, inconsistencies and uncertainties associated with in/out flow of materials, project activities at odd hours & holidays and irregular working hours. Contractor shall ensure prompt and timely availability of such services. |
| **9.17.2** | **PRESERVATION OF COMPONENTS**<br><br>Contractor shall arrange for preservation of components as per BHEL's storage and preservation manual and/or as per instructions of BHEL engineers.<br><br>One or more of following methods shall be adopted for preservation.<br><br>1) Coating with preservative paints/lubricant/inhibitors<br><br>2) Capping/wrapping/covering<br><br>3) Filling/immersion in oil/chemicals etc.<br><br>4) Periodic checks/maintaining required nitrogen pressure in tanks of transformers; BHEL will provide the nitrogen gas for the same. However, contractor shall handle the cylinders at stores, transport to point of use, fit-up refills and return empty cylinders to BHEL stores.<br><br>5) HT motors<br>For preservation of HT motors, space heaters have to be kept energized to avoid ingress of moisture. Insulation resistance has to be measured and recorded at specified intervals till these are issued for erection. BHEL will provide necessary cables, switches etc. For this, however contractor shall install, operate and maintain the same.<br><br>BHEL WILL PROVIDE FREE OF COST ALL PRESERVATIVES LIKE PRESERVATIVE OIL, LUBRICANTS, CHEMICALS, INHIBITORS ETC EXCEPT PRIMERS & PAINTS. CONTRACTOR SHALL PROVIDE RED OXIDE ZINC CHROMATE (ROZC) PRIMER CONFORMING TO IS: 2074 OF REPUTED MANUFACTURES (E.G. ASIAN PAINTS, BERGER, JENSON & NICHOLSON, BOMBAY PAINTS, SHALIMAR OR ANY OTHER BHEL APPROVED MANUFACTURER) REQUIRED FOR PRESERVATION SHALL BE PROVIDED BY THE CONTRACTOR AND USED FOR THIS PURPOSE.<br><br>In the process the identification marks, component/material codes, match marks may have to be repainted. This work after preservation components are to be stacked properly, periodical reports on the preservation carried out should be submitted to BHEL in the prescribed formats. |
| **9.17.3** | **RECORD KEEPING –**<br>Contractor shall prepare, maintain and update various MM records, associated with materials management operation of BHEL at project site. Two systems of record keeping/capturing information & data at various stages are in vogue viz. |

i. Manual ledgers & records.
ii. Computerized database application: BHEL has developed a software application named E-STORE that captures all the data in the entire chain of transactions starting with master list of project materials, records of dispatch, receipt, inspection, issue, return, consumption etc.

Some of these records are master shipping/packing list, LR/RR register, daybook register, stock register, records of issues to & return of materials in respect of various erection subcontractors, insurance claim records, periodical status reports in various formats covering desired aspects and output information as per BHEL/CLIENT'S requirement.

Contractor will provide necessary hardware, software & stationary etc. And shall take utmost care to ensure that these properties and records are protected from any damage or loss. BHEL will recover the cost of such property / expenses of restoration from the contractor with overhead charges in case of any loss/damage attributable to negligence/failure on contractor's part.

**9.17.4** Void

**9.18**

**RESPONSIBILITIES OF THE CONTRACTOR –**

CONTRACTOR HAS TO MOBILIZE BELOW MENTIONED MANPOWER, OTHER THAN SECRETERIAL AND MIENIAL SERVICES MANPOWER MENTIONED, ELSE WHERE IN THIS CONTRACT.

Providing below mentioned manpower is included in the scope of work of Contractor and there shall not be any separate payment for this, under Section-C of rate schedule.

| SL NO | ACTIVITY/DESCRIPTION | TENTATIVE NO. OF PERSONS | REMARKS |
|---|---|---|---|
| 1 | MATERIAL RECEIPT/ UNLOADING, COLLECTION/ BOOKINGS/ PRESERVATION | 6 | To be deployed from the start of contract OR as per instruction of BHEL Engineer |
| 2 | DETAILED VERIFICATION | 4 | |
| 3 | MATERIAL ISSUE (BOILER, TG, ELEC, C&I, STEEL & CEMENT AND T&Ps) | 5 | |
| 4 | RECORD KEEPING (BOILER, TG, ELEC, C&I, STEEL & CEMENT AND T&Ps) | 2 | |
| 5 | RECORD KEEPING (MRC, ASSISTANCE IN INSURANCE CLAIMS, PURCHASE ETC) | 3 | |
| 6 | SAFETY OFFICER | To be deployed as per HSE Manual | |

**NOTE**: The contractor shall deploy skilled people (preferably diploma holders) for carrying out functions/operations stated above. The no. of persons indicated above is tentative and actual deployment may vary based on work load and site requirement. **The manpower requirement shall be finalised in the beginning of the contract period/extension period with Engineer In-charge**. Contractor shall ensure availability of manpower during

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| | extension period as well. This does not absolve the contractor from his responsibility towards the satisfactory execution of the job.<br><br>**In case the contractor does not deploy or delays deployment of above said manpower with reference to specific instructions from BHEL, BHEL will recover non-refundable penalty per man- day @ Rs 500/-** |
| **9.19** | VOID |
| **9.20** | **Weigh Bridge:**<br><br>1. It is envisaged to have 02 nos. of weigh bridge of 100MT Capacity<br>2. Contractor shall provide manpower (One computer operator/ Supervisor in two shifts i.e. one in Morning & other in Evening for each Weighbridge) for operation and maintenance of BHEL owned weighbridges in control room at the construction site. The scope of services shall include record keeping of all the entry through weighbridge, day to day operation and maintenance. The service shall be rendered to suit BHEL site requirement.<br>3. Contractor shall arrange and ensure periodical calibration of the weigh bridge with / from the Government authorized agency / Govt. Department with traceability to National Physical Laboratory of India. Also, all the relevant test as per IS and/or any other requirement shall be arranged by the contractor. The proof of all such calibrations and tests shall be furnished to BHEL. All fees, charges as applicable in this regard are in contractor's scope (01 calibration per weighbridge is envisaged per year).<br>4. Contractor shall arrange Inspection of weigh bridge by the Statutory Authorities during operational phase as applicable. Contractor shall pay all fees, charges etc as applicable (01 inspection is envisaged per year).<br>5. Regular repair, maintenance and upkeep of all installations & facilities of weigh bridge arising out of wear and tear during use particularly of ramps and platforms shall be maintained for satisfactory availability and operation of weigh bridge. All cost towards these incidental charges are in contractor's scope.<br>6. Contractor at all times during the currency of this contract shall possess necessary license, permits as applicable to the provision of the operation of weigh bridge and pay all fee and charges as may be applicable. BHEL shall in no way be held responsible for any of the lapse of the contractor.<br>**7.** Contractor has to ensure the availability of operational weigh bridge to the maximum as possible. All the breakdowns or operational/preventive maintenance are to be arrange by the contractor in consultation with the BHEL. Spares & other supplies of all major repairs shall be in BHEL scope. If contractor fails to maintain the weigh bridge operationality then BHEL reserves the right to take appropriate action for making the weigh bridge operational on cost recovery basis from Contractor plus 5% overheads. Any charges paid by BHEL towards operation & maintenance of weigh bridge shall be deducted from contractor's due bills.<br>8. In case, operation and maintenance of Two no. of weighbridges are to be executed by the contractor with only one computer operators cumulatively in common control room for both the weighbridges for two shifts (i.e. one for Morning and other |

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| | for evening) then appropriate reduction (i.e. manpower rate, as indicted in section C) shall be made from item no. A.3.1 considering the computer operator as skilled manpower. |
| **9.21** | The unloading/handling of cement received through bulker facility is not in the scope of work. However, the receipt and issue records of cement received through bulker/bag facility, directly issued to other civil agencies, shall be maintained by contractor as per the instruction of BHEL engineer.<br>In case, cement bag is to be unloaded in BHEL storage yard, contractor has to execute the work along with its verification and record keeping etc.<br>Also, the receipt and issue records of Reinforcement Steel/ Structural Steel (raw) which are directly issued to/unloaded by other civil agencies, shall be maintained by contractor as per the instruction of BHEL engineer. |
| **9.22** | Contractor shall ensure the availability of sufficient manpower (including issue supervisor) during extended hours to meet the project requirements at site. |

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| **10.** | MATERIAL HANDLING AND MATERIAL MANAGEMENT OF MATERIALS RECEIPT BY RAIL |
| **10.1** | All the consignments reaching the project site by rail shall be unloaded at the railway siding, followed by loading on truck/trailer, local transportation from railway siding to the storage yard/stores, unloading, verification and stacking and preservation as applicable to the consignments arriving by road. The approximate distance form main storage yard to railway siding will be 4-5 KM. |
| **10.2** | It will be responsibility of the contractor to keep in touch with officials of BHEL and railways regarding advance information about arrival of consignments. The contractor shall collect railway receipts or other such dispatch documents. |
| **10.3** | Contractor shall deploy his crane, trailers/trucks and all other T & P including additional T & P and manpower etc for handling of materials at such unloading bay/ location and transport to stores/ storage yard. |
| **10.4** | Contractor shall in his own interest arrange to release the railway wagons/racks with utmost alacrity to avoid any demurrage charges. Demurrage/ wharfage etc., which result due to contractor's fault, shall be recovered from the bill payment due to the contractor**.** |
| **10.5** | Contractor shall provide area lighting at railway siding for handling of materials during evening/ night. |
| **10.6** | All the responsibilities specified in the contractor's scope for the materials received by road shall also be applicable mutatis-mutandis for all the consignments received by rail at railway siding. |
| **10.7** | For the consignments received by rail the payment will be regulated on pro-rata basis on the accepted unit rate as per "TABLE FOR WEIGHTAGES/ FACTORS AND BOQ OF CHAPTER XIV SCHEDULE OF RATES & QUANTITIES"**.** The above also includes all costs towards unloading from the wagon at the unloading siding in the plant and loading on the transport and the cost towards internal transportation to storage yard/ stores shed of BHEL/ client. |
| **10.8** | Quantum of work: one rake may contain approximately 1000 MTs in 45 wagons (approx.). |
| **10.9** | Adequate number of vehicles / handling equipment: It is the responsibility of the contractor to deploy suitable capacity and adequate number of cranes to lift a Consignment along with suitable number of crew members to cater to the tonnage received. For this purpose, the contractor has to work continuously after receipt of wagons at the siding without any break, so as to complete the work within the free time allowed by railway without demurrage and wharfage. The contractor has to deploy adequate number of cranes and trailers. Any demurrage and wharfage levied by railways will be to contractor's account**.** |
| **10.10** | void |

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| **10.11** | Prior notice time: Shipping dept of BHEL units will intimate the contractor well in advance (atleast4 days in advance) regarding the arrival of consignment at the railway siding to enable the contractor for mobilizing the cranes & vehicles and working crew. It is suggested that the contractor has to trace the actual location of rake through online services to avoid last minute rush. |
| **10.12** | RAILWAY RECEIPT AND PREPARATION LR/GC WHILE INTERCARTING. |
| **10.12.1** | BHEL personnel will be deputed to witness/assist for the receipt of materials referred in RR and making appropriate dispatch documents like LR / GC note of the contractors to accompany consignments up to Project Site storage yard. The document prescribed by BHEL has to be maintained by the contractor for verification at any point of time for receipt, storage and inter-carted consignments. |

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| **11.** | **Re-shifting** |
| **11.1** | Owing to several project requirements, many components may have to be shifted from originally stacked locations to elsewhere within the project premises for the lead distance not exceeding 5 kms. This may involve loading of such material onto a vehicle moving to a new location and unloading/stacking including proper inscription of identification marks if needed. List of items duly certified by BHEL official, shifted, updated stock records about change in location etc shall be prepared/submitted along with the monthly bills.<br><br>Transportation of counter weight/structure from one location to other location (within project premises) for load testing of crane/EOT is in the scope of contractor. The said work shall be treated as re-shifting of material.<br><br>Separate item rate is available for re-shifting and restacking of stacked materials and the payment will be regulated on pro-rata basis on the accepted unit rate calculated as per "TABLE FOR WEIGHTAGES/ FACTORS AND BOQ OF CHAPTER XIV SCHEDULE OF RATES & QUANTITIES". |
| **11.2** | **Re-stacking/re-arranging**<br><br>Over a period of time, restacking/rearranging of the materials stacked earlier may arises due to various reasons. The handling of such items will also be in the scope of this contract. The restacking/ re-handling may be necessitated for any equipment/ materials covered within this work specification. Contractor shall deploy necessary resources like manpower, T&P, equipments etc to carry out this exercise including proper inscription of identification marks if needed. List of items duly certified by BHEL official, restacked, updated stock records about change in location etc shall be prepared/submitted along with the monthly bills.<br><br>Restacking/re-arranging shall be applicable for materials returned by BHEL's erection contractors as well.<br><br>Separate item rate is available for reshifting and restacking of stacked materials and the payment will be regulated on pro-rata basis on the accepted unit rate calculated as per "Table for weightages/ factors and BOQ of chapter XIV schedule of rates & quantities" |

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| **12.** | **Material Handling & Material Management of Material Collections/Dispatches** |
| **12.1** | **Incoming materials** |
| **12.1.1** | Even though majority of consignments shall reach site directly for delivery. A good number of consignments shall be booked on Go-downs delivery/ door delivery basis against original consignee copy basis, the procedure of material collection shall be adopted as detailed here below: |
| **12.1.2** | Contractor shall keep in touch with officials of BHEL regarding advance information about arrival of consignments. The contractor shall collect original LRS/RRS/lorry way bills or other such dispatch documents |
| **12.1.3** | The contractor shall remain in regular contact with the concerned transporters or railways based on the dispatch documents obtained as stated above and make all necessary arrangements for collection / receipt of the consignment as applicable. Contractor shall take advance action to deploy all necessary resources for local transportation, handling and unloading of the anticipated consignments so as to ensure no loss of time upon arrival of the consignments. Loading at transporters Go-down, local transport up to BHEL/ client's stores/ site and unloading at stores/storage yard/site, verification and stacking shall also be in the scope of contract |
| **12.1.4** | Detention charges/ demurrage/ wharfage etc**.**, which result due to contractor's fault, shall be recovered from the bill payment due to the contractor. |
| **12.1.5** | Payment will be regulated on pro-rata basis on the **accepted unit rate as per "Table for weightages/ factors and BOQ of chapter XIV schedule of rates & quantities".** No other payment such as minimum charges for carrier etc will be made. All arrangements including transport, labour and other T&P etc is in contractor's scope**.** These godowns are expected to be located within a radius of 50 km approx. from the project site |
| **12.1.6** | All the responsibilities specified in the contractor's scope for the materials received by road shall also be applicable mutatis-mutandis for all the consignments (incoming smalls) received from transporters godown/s. |
| **12.2** | **Outgoing materials/dispatches** |
| **12.2.1** | For varying reasons many a times, project materials/BHEL assets/scraps materials are to be dispatched to other BHEL sites/mfg. Units/other locations. |
| **12.2.2** | Contractor shall identify, tag, pack and prepare gate passes for the materials to be dispatched. Materials shall be loaded onto the outgoing vehicles with due care and handed over to the transporter with clear goods receipt which shall be submitted with BHEL promptly. BHEL shall make arrangement for the transport vehicles at its own cost.<br><br>Payment will be regulated on pro-rata basis on **the accepted unit rate as per "TABLE FOR WEIGHTAGES/ FACTORS AND BOQ OF CHAPTER XIV SCHEDULE OF RATES & QUANTITIES".** |

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| **12.2.3** | Such materials which need to be brought to transporter's/railway godown for booking, arrangements shall be adopted as mentioned below:<br><br>BHEL shall arrange suitable vehicle for transportation of materials from stores/storage yard/site to transporters godowns. Contractor shall identify, tag, pack and prepare gate passes for the materials to be dispatched. Materials shall be loaded onto the outgoing vehicle with due care and handed over to the transporter with clear goods receipt which shall be submitted with BHEL promptly within the quoted rates. Payment will be regulated on pro-rata basis on **the accepted unit rate as per "TABLE FOR WEIGHTAGES/ FACTORS AND BOQ OF CHAPTER XIV SCHEDULE OF RATES & QUANTITIES".** |

| 13 | **Supply installation and maintenance of CCTV camera** |
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| **13.1** | The scope of work includes supply & installation of IP based CCTV system for storage areas, for the purpose of geo-fencing the boundaries with fixed cameras and covering entire inside area of storage (both open yards and covered sheds) with PTZ cameras such that there should not be any dark patch. |
| **13.2** | Surveillance camera should have a backup of at least Three months. All hardware and software required to meet above intent shall be in the scope of bidder. |
| **13.3** | CCTV camera database servers to be provided by the bidder should be latest available in the market with sufficient storage and memory configuration with 4K resolution graphics capability. The servers shall have redundant hot swappable power supply with minimum three no. redundant, hot-swappable hard disks following RAID 5 implementation. Necessary OS, software, antivirus licenses to be provided along with the server hardware for working of the CCTV system. |
| **13.4** | The camera and database servers shall offer both video stream management, video stream storage management. These servers shall also manage and store configuration information/database for the whole system. Recording frame rate & resolution in respect of individual camera shall be programmable. It shall be possible to view and record at different resolutions and frame rates and this shall be individually programmable on every camera. The system shall ensure that all configuration information, video recordings, and user database etc, is suitably replicated on the standby camera/database server(s) so that in the event of failure of one server, the performance of the system is not affected. It shall be possible to take back-up of system configuration and database on removable media i.e. CD/DVD etc. and restoring the same if required.<br>**<u>Other essential items / service under the scope of vendor</u>**<br>1. Bidder shall provide One no Workstation of Intel Core i7, 32 GB DDR5 RAM, 4GB graphics, 1TB SSD/HDD, licensed O/S or better for Managing / configuring all CCTV facility.<br>2. All the camera / RF device / Device should be powered by UPS Power. Necessary quantity of Small UPS (0.6 KVA) or similar to consider with in their scope.<br>3. Any statutory compliance issued by GOI for CCTV system in between during the contract period to be comply by the vendor.<br>4. All software / hardware used for the project shall be licensed & legal<br>5. The VMS Server should be scalable in nature to accommodate additional 25 no's of camera on later date |
| **13.5** | **Smart Storage area/yard monitoring:**<br><br>Smart Storage/Yard Management shall involve entry of Truck/trailers/shipments, identification of unloading area and T&Ps, unloading of consignment, material verification, Record keeping, preservation and issue of material to executing agency. Storage area shall include the open yard area and covered sheds. |

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| | The storage area to be equipped with SSMS (smart storage monitoring system). SSMS shall include monitoring of yard management processes through CCTV cameras. Monitoring shall be done for material storage condition, water logging, excess vegetation and any intrusion inside storage yard.<br><br>PTZ camera shall have auto tracking analytics to track any intruder inside the storage yard. Feed of all these cameras to be available in the Security Control room and BHEL office. |
| **13.5.1** | All the aforementioned data to be available in the Security Control room and BHEL office for monitoring the project activities. The display of feed shall be through two no. of LED screens. The storage yard CCTV system shall have the provision to interconnect with the existing CCTV systems, so that feed of any camera can be seen from any of the CCTV system installed in the project. Detail towards interconnection, method of communication & network to be finalized at the time of installation. |
| **13.5.2** | The contractor shall depute one person round the clock (in shifts) to look after the operation of CCTV system. The payment of operator shall be considered under secretarial services as envisaged in Chapter VII of TCC. |
| **13.6** | **General Requirements:** |
| **13.6.1** | All the cable trays, power packs, erection hardware, mounting arrangement (viz. junction boxes, mounting brackets, glands, housings, nut-bolts, conduits, etc.) are included in the bidder's scope.<br><br>However, Poles/High mast for mounting CCTV shall be provided by BHEL. |
| **13.6.2** | All network mounting racks, NVR (if required) and other required accessories are included in the bidder's scope. |
| **13.6.3** | The bidder shall guarantee satisfactory performance of the equipment under stipulated variations of voltage and frequency. |
| **13.6.4** | UPS of sufficient rating for the operation of CCTV system is to be provided by the agency. |
| **13.6.5** | The output of the CCTV system/camera feed shall be displayed to the LED video wall in the Security Control Room and BHEL/Customer office. The Necessary hardware/software/cables to be supplied by the agency for the same. |
| **13.6.6** | Any other equipment, module, software required for the safe and satisfactory operation, control, protection, monitoring, testing and maintenance of the system shall also be included by the bidder within the quoted price. |
| **13.6.7** | All equipment supplied shall meet the requirements of the applicable International codes and standards or their amendment. Camera certification has to be CE/FCC/UL or equivalent. |
| **13.6.8** | All the network switches shall be of high quality and shall be sized to meet the functional requirements as specified. |
| **13.6.9** | The CCTV system shall be designed as a standalone IP based network architecture with simultaneous recording of all video streams using H.264 or better compression technique. System shall ensure that once recorded, video cannot be altered. |

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| **13.6.10** | Camera shall be provided with sufficient storage space to store recordings (video & audio both) of all cameras at 25/30 FPS at 1920x1080 for a period of fifteen (15) days or more. All recordings shall have camera ID, location, date and time of recording. |
| **13.6.11** | Facility shall be provided to select a camera or a group of cameras in a zone for recording in CIF, 2CIF, 4 CIF, HD(720P) & Full HD(1080P) resolution. |
| **13.6.12** | It shall be possible to export selected portion of recording to portable media devices. The exported clip shall be in commonly used movie file formats e.g. mpg, avi, mp4, etc. and no special software shall be required to view the same. |
| **13.6.13** | Server software shall allow the clients seamless operation of all cameras regardless of the actual connection to different recording servers. Software shall allow client applications to interact with all the camera/database servers simultaneously and allow simultaneous display of live video/recorded video regardless of the zone in which the client is connected. |
| **13.6.14** | The system shall be able to accept potential free contacts from other system and use the same for predefined actions (like zoom/pan/tilt of cameras, bringing out predefined views on predefined monitors etc.) This feature shall be extensively used for linking fire related signals. |
| **13.6.15** | The system operation would be of covering the complete view of areas with pan/tilt zoom, propositioning of the cameras and with programmability to monitor any camera on any monitor either manually or automatically in a defined switching. The system shall be suitable for installation and shall be able to work in dust prone thermal power plant environment. |
| **13.6.16** | The camera and video management software shall be ONVIF compliant. |
| **13.6.17** | It is intended to listen the sound of the selected camera surroundings with minimum noise level along with the video. Any hardware/software required to meet this functionality shall be supplied. |
| **13.6.18** | Quantity variation is applicable for Fixed & PTZ cameras. |
| **13.6.19** | It is intended to listen the sound of the selected camera surroundings with minimum noise level along with the video. Any hardware/software required to meet this functionality shall be supplied. |
| **13.6.20** | For Technical Specifications for **IP Camera Specification (Fixed / PTZ) refer Chapter XVII-** Technical Specifications and Drawings. |
| **13.6.21** | **INSTALLATION SCHEDULE:** |
| **13.6.21.1.** | Supply and Installation of the system shall be done by the agency after obtaining clearance from BHEL engineer at site. |
| **13.6.21.2.** | Normally BHEL shall provide fronts (poles or masts for mounting CCTV cameras) progressively to Contractor for installation of CCTV camera. However, the common system with redundant servers and display system shall be made ready for integration in such a way that that the surveillance system with required specification is operational even if fronts for single camera is made available. |
| **13.6.21.3.** | BHEL shall instruct the contractor every month, to install number of cameras based on the availability of fronts. The contractor shall install every month all the cameras as instructed by BHEL and integrate with CCTV surveillance system to make it operational for monitoring of storage space and unloading activities. |
| **13.6.21.4.** | Installation schedule: |

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| | Installation of CCTV common system with redundant servers and display system - within Three months from the date of intimation by BHEL Construction Manager.<br><br>Installation of Addl. CCTV camera as described in clause 13.6.21.3 - within 30 days from the date of intimation by BHEL Construction Manager. |
| **13.6.21.5.** | If the installation of CCTV system gets delayed beyond 30 days from the scheduled mentioned in clause 13.6.21.4, BHEL shall reserve the right to procure and install the CCTV system and recover the cost thereof from the contractor as per actual purchase and installation charges + 5% overhead. In such case, the scope of comprehensive Maintenance Services of CCTV system shall be removed from the scope of work and no payment shall be made for the same. |
| **13.6.21.6.** | **Delay in supply or installation & commissioning of the system may cause penalty as mentioned below:**<br><br>Case 1. If the installation of CCTV common system with redundant servers and display system is delayed beyond three months (refer installation schedule 13.6.21.4) penal rate of Rs 1000/- per day shall apply.<br><br>Case 2. If the installation of addl. CCTV camera as described in clause 13.6.21.4 is delayed beyond 30 days from the date of intimation penal rate of Rs 400 per camera per day shall apply.<br><br>The number of days for the purpose of calculating penalty shall be as follows:<br>For Case 1: Days beyond Three months after intimation by BHEL, until date of completion of work or alternate arrangement by BHEL (on cost recovery basis).<br><br>For Case 2: Days beyond 30 days after intimation by BHEL, until date of completion of work or alternate arrangement by BHEL (on cost recovery basis). |
| **13.6.22** | **Maintenance** |
| **13.6.22.1.** | Comprehensive Maintenance Services of CCTV system for storage yard is in the scope of contractor. |
| **13.6.22.2.** | Defective equipment/parts to be replaced by the contractor should be of the equivalent or higher configuration. Any equipment replaced/provided to BHEL during this contract shall be retained by BHEL at the end of contract and will be property of BHEL. No additional payment for spares shall be made by BHEL towards replacement of faulty equipment/parts |
| **13.6.22.3.** | All liabilities arising out of any fault /replacement of any part, shall be borne by the vendor, if not mentioned separately otherwise. Any damage or loss caused to the hardware/equipment or to their parts due to negligence, mishandling by resident engineer shall be made good by the vendor at the prevailing market price of that item's or provide a new one (from OEM) of the same make and equivalent or higher specifications. The decision of BHEL in this regard shall be final and binding on the vendor. |

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| **13.6.22.4.** | Maintenance, installation, reinstallation/relocation, trouble shooting and other problems/issues related to CCTV system shall be provided by the vendor during the contract period. |
| **13.6.22.5.** | If any activity or component is required for the completeness or successful functioning of any item, the same shall be part of the scope of work. |
| **13.6.22.6.** | Additional manpower shall be deployed by the vendor (if required) for the completion of the CCTV system maintenance activity within stipulated timelines. No additional payment shall be made by BHEL for the same |
| **13.6.22.7.** | Maintenance service shall cover services, repairs and replacements necessary to keep the equipment in good working order on reasonable use of the equipment during the contract period. |
| **13.6.22.8.** | Preventive maintenance, wherever required, shall be carried out to keep the equipment in good working condition. |
| **13.6.22.9.** | Contractor shall monitor the operations of CCTV installed by BHEL in store yard. Contractor shall immediately inform BHEL in writing, in case any CCTV camera/ necessary component is found non-operational. The faulty component shall be restored within three working days. BHEL shall be informed in writing about the daily status of material handling activities carried out in blind storage space during down-time. |
| **13.6.22.10.** | The contractor shall designate one (01) competent person who will be single point contact taking up issues related maintenance and operation of CCTV system. |
| **13.6.22.11.** | The contractor shall maintain a case sheet/logbook/record of all the complaints made by the users against the hardware/software/network etc. of the CCTV system that shall regularly be shared with BHEL for verification. |
| **13.6.22.12.** | **Penalty for downtime of more than three days shall be Rs 400/- per camera per day.** |
| **13.6.23** | Special Terms & Conditions: |
| **13.6.24** | Non-Disclosure Agreement: The selected bidder after placement of work order and prior to commencement of work must sign the Non-Disclosure Agreement (NDA) as per the format specified by BHEL or any other as mutually agreed. |
| **13.6.25** | Agency shall coordinate with various stakeholders including BHEL, its sub-agencies and Customer, wherever required to execute the contract. |
| **13.6.26** | All Statutory Compliance (as applicable) for execution of the scope of work, shall be in the scope of Agency. No Extra charges shall be made against any statutory compliance. |
| **13.6.27** | No extra payment shall be made for any work executed on Sunday/holidays or beyond official working hours. |
| **13.6.28** | All the software/license procurement, installation for connection/integration to BHEL/Customer's systems shall be in scope of agency. |
| **13.6.29** | For connecting the internal system of BHEL/Customer, suitable hardware / software for secured access is to be provided and configured by the agency in consultation with BHEL/Customer. |
| **13.6.30** | Watch and ward of resources deployed by the agency, at site shall be in the scope of the agency. No claim shall be entertained in case of any theft/damage of resources deployed by the agency. |
| **13.6.31** | All taxes, insurance charges, local law and order obligations (if any) will be complied with/borne by the Bidder |

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| **13.6.32** | Arranging requisite Gate passes (Temporary/permanent/ Sunday / holiday / Night pass) for entering inside the plant area is Agency's responsibility. |
| **13.6.33** | Compliance of all statutory laws, legal obligations, in vogue shall be the responsibility of the owner |
| **13.6.34** | No compensation shall be payable on account of drone accidental damage, idling due to reasons / conditions beyond the control of BHEL. |
| **13.6.35** | Training and demonstration of the system to the concerned officials shall be in the scope of the agency |
| **13.6.36** | The CCTV system shall be designed for visibility in all weather conditions, suitable for day and night to facilitate 24x7 operation for high availability |
| **13.6.37** | Transportation and Installation charges to be included in the price quoted. |

**14.1 Schedule of rates & quantities**

**Section A: Material Handling and Management**

| ITEM NO | DESCRIPTION OF ACTIVITY | UNIT | QTY | Weightage Factor for item Price w.r.t total amount quoted by bidder |
|---|---|---|---|---|
| **Section A1** | | | | |
| A1.1 | Material Handling and Material Management for Materials received through Trucks/Trailers at Project Site | MT | 361493 | 0.49839835 |
| A1.2 | Material Handling and Material Management for Materials received through Railway Wagons at Railway Siding/Station/Godown | MT | 1000 | 0.00315136 |
| A1.3 | Material Handling and Material Management for Materials received at Transporters Godowns within a radius of 50 KM from Project Site | MT | 1000 | 0.00354529 |
| A1.4 | Material Handling and Material Management for Structural steel, Deck sheet, Cladding sheet and Reinforcement steel received through trucks/trailers at project Site | MT | 32195 | 0.03804682 |
| A1.5 | Material (other than Cement) reshifting and re stacking within project premises | MT | 10000 | 0.01256794 |
| A1.6 | Despatch/Outgoing materials (other than Cement) | MT | 4000 | 0.00461450 |
| | | | | |
| **Section A2** | | | | |
| A2.1 | Material Management for:<br>i) Cement received through trucks/trailers in bulkers/bags at project Site (Where unloading of Cement is not in scope of MM agency)<br>ii) Reinforcement Steel / Structural steel (raw) received at project Site (Where unloading of Reinforcement/ Structural steel is done by Civil/other agency) | MT | 406688 | 0.08773009 |
| A2.1(a) | Material Handling and Material Management for Cement received through trucks/trailers in bags at project Site | MT | 1000 | 0.00090039 |
| A2.2 | Material re-shifting and re-stacking for Cement within project premises | MT | 500 | 0.00036578 |
| A2.3 | Despatch/Outgoing for Cement bag materials | MT | 100 | 0.00007503 |
| | | | | |
| **Section A3: *Operation and maintenance of weighbridge*** | | | | |
| A.3.1 | For 100 MT capacity | Months | 112 | 0.05718886 |
| | | | | |
| **Section B: Cranes** | | | | |
| B.1 | Pick and Carry Crane 14/17 MT (in Months) | Months | 110 | 0.06581193 |
| B.2 | Pick and Carry Crane 23 MT (In Months) | Months | 52 | 0.04752453 |

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|---|---|---|---|---|
| B.3 | Pick & Carry Crane 40 MT | Months | 50 | 0.05961144 |
| B.4 | Forklift 5 Ton capacity with 3M lift | Months | 28 | 0.01074300 |
| B.5 | (a) 75MT/80 MT Basic Capacity Tyre Mounted Crane | Months | 32 | 0.08685911 |
| | (b) One Time Mobilisation and Demobilisation charges of above mentioned 75MT/ 80MT Crane | 1 LOT | One Time | 0.00431286 |
| ***Section D : Supply and installation of CCTV system for storage space*** | | | | |
| *D.1* | Supply and Installation of all hardware and software of the IP based PTZ dome camera along with p2p/PMP Outdoor CPE Antenna for wireless communication surveillance system including for storage space. | Nos. | 8 | 0.00178435 |
| *D.2* | Supply and Installation of all hardware and software of the IP based Fixed bullet camera along with p2p/PMP Outdoor CPE Antenna for wireless communication surveillance system including for storage space. | Nos. | 60 | 0.00501967 |
| *D.3* | Supply and Installation of LED Display Screen – Min. 50" with integration capabilities with CCTV system | Nos. | 2 | 0.00044633 |
| ***Section E : Comprehensive maintenance of the CCTV system for storage space*** | | | | |
| E.1 | Comprehensive maintenance of the CCTV system for storage space | Month | 56 | 0.01130237 |

**Section C:** ***Menial and Secretarial Services (Unit Rate Fixed as per minimum wages circular)***

| **SN** | ***Description*** | **Unit** | **Duration** | ***Unit Rate*** | ***Total Amount (In Rs)*** |
|---|---|---|---|---|---|
| *C.1* | *Menial Services (unskilled)* | Man Months | 448 | ₹ 19,833 | ₹ 88,85,184 |
| *C.2* | *Secretarial Services (Skilled)* | Man Months | 560 | ₹ 27,862 | ₹ 1,56,02,720 |
| *C.3* | *Menial Services (Unskilled) - for Grass cutting* | Man Months | 100 | ₹ 19,833 | ₹ 19,83,300 |

## Instruction to Bidders for Vol-II-Price Bid and Schedule of Rates and Quantities

1. **Bidders shall quote Total Lump-sum Price for the entire scope of work excluding Section-C fixed Cost in Rupees for Tendered Package only in VOL II PRICE BID at BHEL E-procurement Portal.** Any other entry elsewhere in the offer of the bidder shall be treated as Null and Void. Offer evaluation of the bidders shall be done based on the Total Price of as quoted in the Volume II Price Bid

2. Schedule of Rates and Quantities consist of the followings:
   Section-A Material Handling and Management: Section-A1, A2 & A3
   Section-B: Crane.
   Section-C: Menial and Secretarial Services **(pre-fixed Prices by BHEL).**
   Section-D: Supply and installation of CCTV system for storage space.
   Section-E: Comprehensive maintenance of the CCTV system for storage space.

3. BHEL has pre-fixed the Weightages / Factor as detailed above in this chapter for deriving the Unit Rates for the BOQ item. "Item Price" for BOQs i.e. Sections- A1, A2 & A3, Section-B, Section D and Section E shall be derived by multiplying BHEL pre-fixed "Weightage Factor" and the "Total Quoted Price" as per Sl.no.1 above.
4. Further to calculate **Unit Item Rate**, the item price arrived at Sl. No.3 above shall be divided by respective quantities, rounding down to two decimal places.
5. Grand Total of **BOQs-** Section- A1, A2 & A3+ Section-B+ Section D+ Section E shall be derived by summing up the actual total amount of individual items derived by multiplying Quantities with respective Unit Item rates as per Sl. No. 4 above, rounding off to zero decimal places.
6. Final awarded value for the Subject Job shall be obtained by adding Total of Section A1, A2 & A3+ Section B + Section D+ Section E as derived in Sl. No.5 above and then adding **Fixed Cost of Section-C**.
7. Bidders to note that this is an 'Item rate contract'. Payment shall be made for the actual quantities of work executed at the Unit rate arrived above.

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| **15.0** | **General** |
| **15.1** | The intent of specification is to provide material handling and materials management services according to the most modern and proven techniques and codes. The omission of specific reference to any method, equipment or materials necessary for proper and efficient unloading, transportation, verification, stacking & preservation etc shall not relieve the contractor of the responsibility of providing such facilities to complete the work without any extra compensation. |
| **15.2** | The work shall be executed under usual conditions affecting major thermal power projects in an existing power plant and in conjunction with numerous other operations at site. The contractor and his personnel shall cooperate with personnel of customer's contractors, coordinating his work with others and proceed in a manner that shall not delay or hinder the progress of work as a whole. |
| **15.3** | The distances indicated elsewhere in the tender are only approximate. However, the tenderers should assess the various distances and site conditions by visiting site before submitting their offer. No additional/extra claims for any variation in this regard will be entertained |
| **15.4** | Contractor shall arrange for cutting and removal of vegetation growth/grass etc. in the storage yard as and when called for by BHEL as incidental to work. Payment shall be made as indicated in BOQ. |
| **15.5** | Housekeeping of closed sheds are also included in the scope of work. Contractor shall carry out the housekeeping works on regular intervals (once a week). |
| **15.6** | The tools and tackles received from various BHEL units are to be handed over to customer after completion of work at site. It shall be the responsibility of contractor to handover tools and tackles to customer through BHEL and make necessary handing over protocols. |
| **15.7** | If the contractor or his workmen break, cable, deface, injures or destroy any part of building, road, kerbs, fence enclosures, water pipes, drains, electric/ telephone poles or wires, trees or any other property or damage any part of erected stores/equipment, stored components etc., within the project premises or outside, the contractor shall make the same good at his own expenses (of which BHEL site engineer's decision shall be final) failing which the site engineer shall get the same rectified by other agencies and recover the cost from the contractor and the same shall be deducted from the sums that may be due then or at any time thereafter become due to the contractor or even from his security deposit. |
| **15.8** | **PLEASE NOTE: TANDEM OPERATION FOR MATERIALS HANDLING/ERECTION/LIFTING/ LOWERING FROM HEIGHTS NEEDS TO BE APPROVED BY BHEL/CUSTOMER.** |

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| **16.0.** | **SPECIAL CONDITION OF CONTRACT (Clauses mentioned in earlier Chapters of TCC will supercede in case of conflict with clauses mentioned in this chapter)** |
| **16.1.** | **INTENT OF THE SPECIFICATION** |
| **16.1.1.** | The intent of this specification is to provide services for execution of the project according to most modern and proven techniques and codes. The omission of specific reference to any method, equipment or material necessary for the proper and efficient services, shall not relieve the contractor of the responsibility of providing such services / facilities to complete the work or portion of work awarded to him. The quoted / accepted rates / price shall deem to be inclusive of all such contingencies. |
| **16.1.2.** | The work shall conform to requirement given in various documents that will be provided during execution. If any portion of works is found to be defective in workmanship and not conforming to documents or other stipulations, the contractor shall dismantle and re-do the work duly replacing the defective materials at their own cost, failing which recoveries, as determined by BHEL, shall be affected from contractor's bills. In case, drawings/ instructions get revised in the course of execution, latest revision shall be applicable and work has to be executed accordingly. In case, drawings/ instructions get revised after completion, latest revision shall be applicable and rework has to be executed accordingly by vendor without any objection. Any extra work /rework shall be paid as per respective clauses in GCC. |
| **16.1.3.** | It is not the intent of this specification to specify herein all the details of execution. However, the system shall conform in all respects to high standards of quality and workmanship for performing the required duties in a manner acceptable to purchaser who will interpret the meaning of documents and specifications and shall be entitled to reject any work or material, which in his judgments is not in full accordance herewith. |
| **16.1.4.** | The omission of specific reference to any work or method, equipment or material necessary for proper and efficient working of the plant shall not relieve the tenderer of the responsibility of providing such facilities to complete the work at quoted rates. Any mismatch/ defect found due to mistake in workmanship shall have to be rectified by the vendor free of cost. Inspection by BHEL/Customer does not relieve vendor of his responsibility of executing quality work. |
| **16.1.5.** | The work covered under this specification is of highly sophisticated nature, requiring the best quality workmanship, supervision, engineering and construction management. The contractor should ensure proper planning and successful and timely completion of the work to meet the overall project schedule. The contractor must deploy adequate quantity of tools & plants, modern / latest construction aids etc. He must also deploy adequately trained, qualified and experienced supervisory staff and skilled personnel. |
| **16.1.6.** | BHEL Engineer's decision regarding correctness of the work and method of working shall be final and binding on the contractor. No claims for extra payment from the contractor will be entertained on the ground of deviation from the methods / sequence adopted. |
| **16.1.7.** | Following shall be the minimum responsibility of contractor and have to be provided within finally accepted rates / prices: |

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| **16.1.8.** | Provision as required of all types of labour, supervisors, engineers, watch and ward, tools & tackles, calibrated MMEs (Monitoring and Measuring Equipment) as specified and otherwise required for the work, consumables for erection, testing and commissioning–including material handling as applicable following safe erection methodology and BHEL HSE norms of HIRA (Hazard Identification and Risk assessment) / JSA(Job Safety analysis). |
| **16.1.9.** | Achieving Proper out-turn / Turn-over as per BHEL plan and commitment. |
| **16.1.10.** | Completion of work as per BHEL Schedule. |
| **16.1.11.** | Good quality and accurate workmanship. |
| **16.1.12.** | Repair and rectification. |
| **16.1.13.** | Preservation / Re-conservation of all components during custody/storage till handover. |
| **16.2.** | GENERAL SERVICES TO BE RENDERED BY THE BIDDER |
| **16.2.1.** | Deployment of all skilled and unskilled manpower required for execution, supervision, watch & ward, and other services to the rendered under this specification. |
| **16.2.2.** | Deployment of all erection tools & tackle, construction machinery, transportation vehicles and all other implements in adequate number and size, appropriate for the erection work to be handled under scope of this specification except otherwise specified. |
| **16.2.3.** | Supply of all consumables, e.g. cleaning agents, diesel oil, lubricant etc. as necessary for such erection work, unless specified otherwise. |
| **16.2.4.** | Providing support services for the contractor's execution staff e.g. construction of site offices, residential accommodation and transport to work site for executing personnel. |
| **16.2.5.** | Maintaining proper documentation of all the activities undertaken by the Contractor as per the proforma mutually agreed with BHEL, Submission of monthly progress reports with photographs /PPT and any such document as and when desired by BHEL/owner, taking approval of all statutory authorities i.e. Boiler Inspector, Factory Inspector etc., as applicable for respective portions of work fall under the jurisdiction of such statutes of laws. |
| **16.2.6.** | Any other service, although not specifically called for but required for a contract of the size and nature indicated in the specification. |
| **16.3.** | **GENERAL TECHNICAL REQUIREMENTS** |
| **16.3.1.** | Except where otherwise specified, the plant/equipment shall comply with the appropriate Indian Standard or an agreed internationally accepted Standard Specification as mentioned elsewhere in contract specifications, each incorporating the latest revisions at the time of tendering. Where no internationally accepted standard is applicable, the Bidder shall give all particulars and details as necessary, to enable BHEL to identify all of the plant/equipment in the same detail as would be possible had there been a Standard Specification. |

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| **16.3.2.** | Tools brought by contractor that will be used during execution shall not be accepted except with the specific approval of the Engineer including third party inspection if required. |
| **16.4.** | **OBLIGATIONS OF CONTRACTOR** |
| **16.4.1.** | **CONSUMABLES & OTHER ITEMS FOR THE SCOPE OF WORK (**excepting those indicated in BHEL scope) |
| **16.4.1.1.** | The contractor shall provide within finally accepted price / rates, all consumables (excepting those indicated in BHEL scope) for the scope of work. |
| **16.4.1.2.** | It shall be the responsibility of the contractor to plan the activities and store sufficient quantity of consumables. Non-availability of any consumable materials or equivalent suggested by BHEL cannot be considered as reason for not attaining the required progress or for additional claim. |
| **16.4.1.3.** | BHEL reserves the right to reject the use of any consumable, if it is not found to be of the required standard / make / purity or when shelf life has expired. Contractor shall ensure display of shelf life on consumable wherever required and records maintained. |
| **16.4.1.4.** | Storage of all consumables shall be done as per requirement / instruction of the Engineer by the contractor at his cost. |
| **16.4.1.5.** | In case of improper arrangement for procurement of any consumable, BHEL reserves the right to procure the same from any source and recover the cost from the Contractor's first subsequent bill at market value plus the applicable 5% overheads of BHEL from time to time. Postponement of such recovery is normally not permitted. The decision of Engineer in this regard shall be final and binding on the Contractor. |
| **16.4.1.6.** | All charges on account of any kind of taxes and duties on Consumable obtained from any source for carrying out the works in the scope of the contractor shall be borne by the contractor. |
| **16.4.2.** | **TOOLS AND PLANTS / MONITORING AND MEASURING EQUIPMENT (MMEs)** |
| **16.4.2.1.** | All T&Ps and MMEs excepting those specifically indicated in BHEL scope are to be provided by the Contractor. Contractor has to make his own arrangement at his cost for completing the formalities (including arrangement of Road permits / e-way bill, if any) if required with tax authorities, for bringing their materials, plants and equipments at site for the execution of work under this contract. |
| **16.4.2.2.** | VOID |
| **16.4.2.3.** | All T&Ps to be deployed by the contractor shall have the approval of BHEL Engineer with regard to brand, quality and specification. |
| **16.4.2.4.** | Timely deployment of adequate T&Ps is the responsibility of the contractor. The contractor shall be prepared to augment the T&P at short notice to match the planned programme and to achieve the milestones. |
| **16.4.2.5.** | Contractor shall maintain and operate his tools and plants in such a way that major breakdowns are avoided. In the event of major breakdown, contractor shall make alternative arrangements expeditiously so that the progress of work is not hampered. |

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| **16.4.2.6.** | In the event of contractor failing to arrange the required tools, plants, machinery, equipment, material or non-availability of the same owing to breakdown, BHEL will make alternative arrangement and recover the expenses incurred from the dues payable to contractor. Recoveries shall be as per relevant clauses mentioned in TCC. Decision of BHEL shall be final and binding on the contractor.<br>It is not obligatory on the part of BHEL to provide any tools and tackles or other materials other than those specifically agreed to do so by BHEL. However, depending upon the availability, BHEL/ BHEL's Customer handling equipment and other plants may be made available to the contractor on payment of hire charges as fixed, subject to the conditions laid down by BHEL/ Customer from time to time. Unless paid in advance, such hire charges, if applicable, shall be recovered from contractor's bill/ security deposit or any other due payment in one instalment. |
| **16.4.2.7.** | The T&P to be arranged by the contractor shall be in proper working condition and their operation shall not lead to unsafe condition. The movements of cranes, and other equipment should be such that no damage / breakage occurs to foundations, other equipments, material, property and men. All arrangements for the movement of the T&P etc. shall be the contractor's responsibility. |
| **16.4.2.8.** | The contractor at his cost shall carry out periodical testing of his equipment. Test certificates shall be furnished to BHEL. |
| **16.4.2.9.** | Contractor shall ensure deployment of serviced and healthy T&Ps including cranes, lifting tackles, wire ropes, manila ropes, winches and slings etc. History card and maintenance records for major T&Ps will be maintained by the contractor and will be made available to BHEL Engineer for inspection as and when required. Fitness certificate / Test Certificates of T&P shall have to be submitted before it is put in use. Identification for such T&Ps will be done as per BHEL Engineer's advice.<br>BHEL reserves the right to permit only new slings up to 20 mm and lifting tackles up to 3 MT capacities.<br>Contractor shall deploy trained Trailer and Crane Operator to enable safe operations at site. Necessary licenses should be available with them and a copy of the same shall be submitted to BHEL. |
| **16.4.2.10.** | Contractor shall ensure deployment of reliable and calibrated MMEs (Inspection measuring and Monitoring equipment). The MMEs shall have test / calibration certificates from authorized / Government approved / accredited agencies traceable to National / International standards. Each MME shall have a label indicating calibration status i.e. date of calibration, calibration agency and due date for calibration. A list of such instruments deployed by contractor at site with its calibration status is to be submitted to BHEL Engineer for control. |
| **16.4.2.11.** | Re-testing / re-calibration shall also be arranged at regular intervals during the period of use as advised by BHEL Engineer within the contract price. The contractor will also have alternate arrangements for such MME so that work does not suffer when the particular instrument is sent for calibration. If any MMEs not found fit for use, BHEL shall have the right to stop the use of such item. It will be necessary for the contractor to deploy proper item. Any readings taken by the defective instrument will be recalled and repeat the readings taken by that instrument with a proper one. In case he fails to do so, BHEL may deploy MMEs and retake the readings at contractor's cost. |

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| **16.4.2.12.** | BHEL shall have lien on all T&P, MMEs and other equipment of the contractor brought to the site for the purpose of work awarded by BHEL. BHEL shall continue to hold the lien on all such items throughout the period of contract / extended period. The contractor and / or his sub-contractors, without the prior written approval of the Engineer, shall remove no material brought to the site for the purpose of work awarded by BHEL. |
| **16.4.2.13.** | The month wise T&P deployment plan to execute the work is to be submitted as per relevant format as per the instruction of BHEL. It shall be the contractor's responsibility to deploy the required T&P, for timely and successful completion of the job, to any extent. |
| **16.4.3.** | **Obligations in respect of T&Ps and MMEs provided by BHEL** |
| **16.4.3.1.** | T&P / MMEs being provided by BHEL to sub-contractor free of hire charges shall be shared by other subcontractors working for BHEL at site and the allotment done by BHEL Engineer shall be final and binding. |
| **16.4.3.2.** | BHEL T&P will be issued in basic assembled condition. Additional loose components / sub-assemblies / attachments as and when necessary, will be issued by BHEL. Assembly of such additional loose components/sub-assemblies/ attachments is in contractor's scope. |
| **16.4.3.3.** | Increasing / shortening of the crane boom to suit work requirements shall have to be arranged by the indenting contractor at his cost including restoration to a state as directed by BHEL. All necessary manpower tools, support, consumables, illumination etc. will have to be arranged by contractor at his cost. If required, contractor has to return the crane with original boom. |
| **16.4.3.4.** | The area and infrastructure development of the area to be carried out by the customer. However, in construction projects of this magnitude it is possible that all the areas / approaches may not be ready. In such cases arrangement of sleepers etc. for safe operation / movement of equipment including cranes / trailers etc. shall be the responsibility of the contractor at his cost. No compensation on this account shall be payable. |
| **16.4.3.5.** | In the event of contractor not using and maintaining BHEL T&Ps according to BHEL's instructions. BHEL will have the right to withdraw such item without any notice and no claim in this regard shall be entertained and contractor shall be responsible for delay in execution on this account. |
| **16.4.3.6.** | The contractor shall furnish regular utilization report of the BHEL T&Ps, as per requirement of BHEL. |
| **16.4.3.7.** | Any loss / damage to any part of BHEL T&Ps and MMEs shall be to the contractor's account and any expenditure on these accounts by BHEL will be recovered from the contractor's bill in case the contractor fails to make good the loss. |
| **16.4.3.8.** | It shall be responsibility of the contractor to take delivery of T&Ps and MMEs from stores or place of use by other contractor at project site, transport the same to site and return the same to BHEL store / place as intimated by Engineer in project site in good working conditions after use. |

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| **16.4.3.9.** | The contractor shall return BHEL T&Ps and MMEs issued to him in good working condition as and when desired by BHEL (on completion or reduction of workload). If contractor delays return of T&P and MME, hire charges as applicable shall be levied by BHEL from time, it was requisitioned till the time of actual return.<br>T&Ps and MMEs returned in damaged / unserviceable condition shall be got repaired by BHEL at its own discretion and actual expenses incurred plus 5% overheads shall be recovered from the contractor. |
| **16.4.3.10.** | Replacement cost including BHEL overheads in respect of irreparable / completely damaged / non-return of T&Ps and MMEs shall be recovered from the contractor's running / final bills |
| **16.4.4.** | **Obligations in respect of Cranes provided by BHEL** |
| **16.4.4.1.** | BHEL will make available the cranes (as specified elsewhere in Technical Conditions of Contract**)** free of charge to the contractor on sharing basis mainly for the purposes enumerated/indicated therein**.** BHEL cranes have to be shared with other agencies / contractors of BHEL. The allocation of cranes shall be the discretion of BHEL engineer, which shall be binding on the contractor.<br>The Crane shall be available for (14) fourteen hours inclusive of one-hour lunch break daily, excluding Sundays and scheduled Holidays. For Crane working beyond normal working hours or on Sundays /Holidays, prior permission of the BHEL Site In-charge/ Construction Manager is to be obtained. However, BHEL Site In-charge/ Construction Manager's decision in this regard will be final after judging the proficiency of the contractor's crane requirement**.** |
| **16.4.4.2.** | BHEL Cranes may be initially issued in basic assembled condition. Any alteration/addition like boom reduction / extension, assembly of components/sub-assemblies needed for modulating the capacity/reach/other features of cranes and restoration to the state as directed by BHEL shall be the contractor's responsibility**.** |
| **16.4.4.3.** | The day-to-day upkeep and running maintenance of BHEL Cranes are excluded from the scope. However, any additional helpers if any required during Preventive / Breakdown Maintenance, Assembly / disassembly shall be provided by contractor at no extra cost.<br><br>BHEL may also provide cranes through crane hiring agencies in which case the day-to-day upkeep and running maintenance shall be excluded from scope of contractor. |
| **16.4.4.4.** | Minor consumables like cotton cloth, cotton waste, etc. is to be supplied by Contractor. All spares and lubricants/grease are excluded from scope. |
| **16.4.4.5.** | VOID |
| **16.4.4.6.** | BHEL cranes will be withdrawn for regular and capital maintenance as per the respective schedule of maintenance. As far as possible such schedules will be intimated to the contractor in advance and may be adjusted depending on the work requirements at site. However, no claim whatsoever will be entertained on account of non-availability of cranes. |
| **16.4.4.7.** | Where the services of the cranes provided by BHEL are to be shared by other agencies / contractors of BHEL, the contractor's responsibilities defined above will also be apportioned accordingly to the beneficiary agency. Working arrangements in this regard will be done at site by BHEL engineer and in any case his decision shall be final and binding. |

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| **16.4.4.8.** | Major breakdowns will be attended to by BHEL. However, in case of breakdowns or damages due to negligence of the contractor, the complete service/repair charges including cost of spares plus 5% overheads shall be recovered from the contractor. |
| **16.5.** | **RESPONSIBILITIES OF CONTRACTOR IN RESPECT OF LABOUR, SUPERVISORY STAFF, ETC.** |
| **16.5.1.** | Refer relevant clauses of General Conditions of Contract (GCC) also in this regard |
| **16.5.2.** | The contractor shall deploy all the necessary skilled/semiskilled/ unskilled labour including highly skilled workmen etc. These workmen should have previous experience on similar job. They shall hold valid certificates wherever necessary. BHEL reserves the right to insist on removal of any employee of the contractor at any time if he is found to be unsuitable and the contractor shall forthwith remove him. |
| **16.5.3.** | Contractor shall also comply with the requirements of local authorities/ project authorities calling for police verification of antecedents of the workmen, staff etc. |
| **16.5.4.** | It is the responsibility of the contractor to engage his workmen in shifts and or on overtime basis for achieving the targets set by BHEL. This target may be set to suit BHEL's commitments to its customer or to advance date of completion of events or due to other reasons. |
| **16.5.5.** | Contractor shall provide at suitable arrangement for urinal and drinking water facility with necessary plumbing & disposal arrangement including construction of septic tank. These installations shall be maintained in hygienic condition at all times. |
| **16.5.6.** | The Contractor in the event of engaging 20 or more workmen, shall obtain Independent license under the Contract labour (Regulation and Abolition) Act 1970 from the concerned authorities based on Form-V issued by the Principal Employer/Customer. In order to issue Form-V by Customer, Contractor shall fulfill all Statutory requirements like Insurance Policy, PF Code/PF Account number etc. as per the requirement of BHEL/Customer |
| **16.5.7.** | Contractor shall deduct the necessary amount towards Provident Fund and contribute equal amount as per Government of India laws. This amount will be deposited regularly to the provident Fund Commissioner. BHEL/Customer may insist for submission of the account code duly certified by PF Commissioner |
| **16.5.8.** | Contractor may also be required to comply with provisions of ESI Act in vogue if applicable and submit evidence to BHEL. |
| **16.5.9.** | BHEL / customer may insist for witnessing the regular payment to the labour. They may also like to verify the relevant records for compliance with statutory requirements. Contractor shall enable such facilities to BHEL / Customer. |
| **16.5.10.** | Contractor shall deploy only qualified and experienced engineers/ supervisors. They shall have professional approach in executing the work. |
| **16.5.11.** | The contractor's supervisory staff shall execute the work in the most professional manner in the stipulated time. Accuracy of work and aesthetic finish are essential part of this contract. |
| **16.5.12.** | The supervisory staff employed by the contractor shall ensure proper outturn of work and discipline on the part of the labour put on the job by the contractor. Also, in general they should see that the works are carried out in a safe and proper manner and in coordination with other labour and staff employed directly by BHEL or other contractors of BHEL or BHEL's client. |

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| **16.5.13.** | It is the responsibility of the contractor to arrange gate pass for all his employees, T&P etc. for entering the project premises. Necessary coordination with customer officials is the responsibility of the contractor. Contractor to follow all the procedures laid down by the customer for making gate passes. Where permitted, by customer / BHEL, to work beyond normal working hours, the contractor shall arrange necessary work permits for working beyond normal working hours. |
| **16.5.14.** | The actual deployment of Labour and Engineer / supervision staff shall be so as to satisfy the erection and commissioning targets set by BHEL. If at any time, it is found that the contractor is not in a position to deploy the required engineers / supervisors / workmen due to any reason, BHEL shall have the option to make alternate arrangements and recover the expenses incurred from the dues payable to contractor. The expenditure incurred along with BHEL overheads thereon shall be recovered from the contractor. |
| **16.5.15.** | Contractor shall not deploy women labour at night. |
| **16.6.** | **MATERIAL HANDLING, STORAGE AND PRESERVATION ETC** |
| **16.6.1.** | **MATERIAL HANDLING AND STORAGE** |
| **16.6.1.1.** | All the equipments/materials furnished under this contract shall be stored in the storage spaces in a manner so that they are easily retrievable. **While handling/issuing material in BHEL / customer stores, the contractor shall ensure that the balance / other materials are stacked back immediately.** |
| **16.6.1.2.** | The contractor shall endeavor to store / stack / identify materials properly in their open / close / semi closed / tarpaulins covered storage yard / shed. They should take the delivery of the same, following the procedure indicated by BHEL. |
| **16.6.1.3.** | The contractor shall process issue of components, equipment / consumables from storage area to erection agency after getting the approval of BHEL Engineer on standard indent forms. |
| **16.6.1.4.** | The contractor shall identify and deploy necessary Engineers / supervisors / workmen for the above work in sufficient number as may be needed by BHEL, for areas covering their scope. |
| **16.6.1.5.** | All the equipment shall be handled very carefully to prevent any damage or loss. No untested wire ropes / slings etc. shall be used for unloading / handling. The equipment shall be properly protected to prevent damage either to the equipment or to the floor where they are stored. |
| **16.6.1.6.** | Contractor shall ensure that while lifting slings shall be put over the points indicated on the equipment or as indicated in the manufacturer's drawings. Slings / shackles of proper size shall be used for all lifting and rigging purposes. All care shall be taken to safe guard the equipment against any damage. Dragging of piping / valves should be avoided. In case of any damage the cost shall be covered from the contractor. |
| **16.6.1.7.** | Approach road conditions within the storage area and from stores / yards to the erection site may not be equipped and ideal for smooth transportation of the equipment. Contractor may have to be adequately prepared to transport the materials under the above circumstances without any extra cost. The contractor may familiar himself with soil conditions at site. Any damage to the materials due to improper lifting practices or failure of ropes/slings used by vendor shall be recovered by BHEL from vendor. Recoveries shall be actual expenses incurred plus 5% overheads. |

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| **16.6.1.8.** | Void |
| **16.6.1.9.** | The contractor shall maintain an accurate and exhaustive record-detailing out the list of all material received by him and keep such record open for the inspection of the engineer at any time. |
| **16.6.1.10.** | All the material stored in the open or dusty locations must be covered with suitable weather proof / fire retardant covering material wherever applicable and shall be blocked up on raised level above ground. All covering materials including blocks and sleeper shall be arranged by the contractor at his cost. |
| **16.6.1.11.** | If the material belonging to the contractor are stored in area other than those earmarked for his operation the engineer will have the right to get it moved to the area earmarked for the contractor and the cost along with applicable overheads shall be recovered from Contractor. Recoveries shall be actual expenses incurred plus 5% overheads. |
| **16.6.1.12.** | The Engineer will direct the contractor about material, the items in his opinion which will require indoor storage, and the contractor shall comply with Engineer's decision. |
| **16.6.1.13.** | It shall be the responsibility of the contractor to keep the work / storage areas in neat, tidy and working conditions. All surplus/unusable packing and other materials shall be removed and deposited at location(s) specified by BHEL within the project premises. If required weighing of the same within the project premises will have to be carried out. |
| **16.6.2.** | **PRESERVATION OF COMPONENTS** |
| **16.6.2.1.** | After receipt, plant materials storage shall be subjected to the following protection besides other provisions indicated in these specifications elsewhere. |
| **16.6.2.2.** | Items stored outdoors shall be stacked up at least six inches (6") off the ground. Items should not be stored in a low lying area where water logging is a possibility. Contractor should have sufficient numbers of sleepers for the job. |
| **16.6.2.3.** | Motors, valves, electrical equipment, control equipment and instruments, and special or precision items requiring special care, etc shall be stored indoors. Motor windings shall be kept dry by use of external heat or space heaters. Any loose items supplied along the motors, electrical equipment like Junction Boxes, Lugs, Cable Glands etc are to be kept under the safe custody of the bidder. |
| **16.6.2.4.** | Bearings and other wearing surfaces of plant materials shall be protected against corrosion and kept clean and should be regularly monitored. |
| **16.6.2.5.** | Insulation materials shall be stored indoors or otherwise protected against getting wet/ damaged, using suitable measures and should be protected from direct rain. |
| **16.6.2.6.** | It shall be the responsibility of the contractor to apply preservatives / touch up paints (primer) on equipment handled, as per preservation manual. It shall be contractor's responsibility to apply required paints (primer), thinners, labour, scaffolding materials, cleaning materials like wire brush, emery sheets, etc., cleaning of surface and provide one coat of preservatives / paints (primer) from time to time as decided by BHEL engineer, the scope of arranging preservatives shall be as per the scope mentioned elsewhere in TCC. |
| **16.6.2.7.** | VOID |

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| **16.6.2.8.** | Any failure on the part of contractor to carry out works according to above clauses will entail BHEL to carry out the job from any other party and recover the cost from contractor. |
| **16.7.** | **DRAWINGS AND DOCUMENTS** |
| **16.7.1.** | The contractor shall for the purpose of identification and proper traceability of material, divide the storage space in grids with approach roads for proper mobility of material handling equipments. Each grid shall be assigned an identification code. The same shall be displayed in the storage yard. A layout drawing for each storage yard depicting the grids marked with identification code shall be maintained by the contractor. |
| **16.7.2.** | In case of restacking/shifting of material to a different storage place, the contractor has to maintain the records of material shifted with trail of earlier stacking location. |
| **16.7.3.** | The contractor shall maintain a record of preservation activities carried out on daily basis. |
| **16.7.4.** | The data furnished in various annexure enclosed with this tender specification are only approximate and for guidance. However, the change in the design and in the quantity may occur as is usual in any such large scale of work. The contractors quoted rates shall be inclusive of the above factor. |
| **16.7.5.** | Should any error or ambiguity be discovered in the specification or information the contractor shall forthwith bring the same to the notice of BHEL before commencement of work. BHEL's interpretation in such cases shall be final and binding on the contractor. |
| **16.8.** | **INSPECTION AND QUALITY** |
| **16.8.1.** | **Inspection, Quality Assurance, Quality Control** |
| **16.8.1.1.** | A daily log book should be maintained by every supervisor / engineer of contractor on the job in duplicate (one for BHEL and one for contractor) for detailing and incorporating for the material handling activities carried out, including preservation, verification of received material issue of material etc. |
| **16.8.1.2.** | Contractor shall provide all the Measuring Monitoring Equipments (MMEs) required for completion of the work satisfactorily. These MMEs shall be of brand, quality and accuracy specified by BHEL Engineer and should have necessary calibration and other certificates as per the requirement of BHEL Engineer. Decision of BHEL Engineer regarding acceptance or otherwise of the measuring instruments / gauges / tools for the work under this specification, is final and binding on the contractor. BHEL may give an indicative list of MMEs required for this work and to be made available by the contractor. The list will be reviewed by BHEL and the contractor shall meet any augmentation needed wherever required. |

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| **16.8.1.3.** | BHEL, Power Sector Regions (PSNR / PSER / PSWR / PSSR) have already been accredited with ISO 9001 certification and as such this work is subject to various audits to meet ISO 9001 requirements. One particular aspect which needs special mention is about arrangement of calibration of instruments by the contractor. Contractor shall ensure deployment of reliable and calibrated MMEs (Measuring and Monitoring Equipments). The MMEs shall have test / calibration certificates from authorized / Government approved / Accredited agencies traceable to National / International Standards. Re-testing / re-calibration shall also be arranged at regular intervals during the period of use as advised by BHEL Engineer within the contract price. The contractor will also have alternate arrangements for such MMEs so that work does not suffer when the particular equipment / instrument is sent for calibration. Also if any MMEs not found fit for use, BHEL shall have the right to stop the use of such item and instruct the contractor to deploy proper item and recall i.e. repeat the readings taken by that instrument, failing which BHEL may deploy MME and retake the readings at Contractor's cost. |
| **16.8.1.4.** | Total Quality is the watchword of the work and Contractor shall strive to achieve the Quality Standards, procedures laid down by BHEL. He shall follow all the instructions as per BHEL drawings and Quality Standards. |
| **16.8.2.** | **Stage Inspection By FES / QA Engineers** |
| **16.8.2.1.** | Apart from day-to-day inspection by BHEL Engineers stationed at Site and Customer's Engineers, inspection of equipments in storage shall also be conducted by teams of Engineers from Field Engineering Services of BHEL's Manufacturing Units, Quality Assurance teams from Field Quality Assurance, Unit/Factory Quality Assurance and Commissioning Engineers from Technical Services etc. Contractor shall arrange all labour, tools and tackles etc. along with proper access for such stage inspections free of cost. |
| **16.8.2.2.** | Any modifications suggested by BHEL FES and QA Engineers' team shall be carried out. Claims of contractor, if any, shall be dealt as per contract, and provided such modifications have not arisen for reasons attributable to the contractor. |
| **16.8.3.** | **Statutory Inspection of Work** |
| **16.8.3.1.** | Sometimes the materials stacked at storage space and the facilities has to be offered for inspection, to various statutory authorities for compliance with applicable regulations.<br>The statutory inspections, though not limited to, are as under:<br>1) Inspectorate of Steam Boilers and Smoke Nuisance.<br>2) Electrical Inspector.<br>3) Factory Inspector, Labour Commissioner, PF Commissioner and other authority connected to this project work.<br>The scope includes providing assistance for inspection visits of statutory authority periodically as per BHEL Engineer's instructions, arranging materials for ground inspection. |

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| **16.8.3.2.** | The Quality Management System of BHEL, Power Sector Regions (PSNR / PSER / PSWR / PSSR) have already been certified and accredited under ISO 9002 standards in this regard. The basic philosophy of the Quality Management System is to define the organizational responsibility, work as per documented procedures, verify the output with respect to acceptance norms, identify the non-conforming product / procedure and take corrective action for removal of non-conformance specifying the steps for avoiding recurrence of such non-conformities, & maintain the relevant quality records. The non-conformities are to be identified through the conduct of periodical audit of implementation of quality systems at various locations/stages of work. Suppliers / vendors of various products / services contributing in the work are also considered as part of the quality management system. as such the contractor is expected not only to conform to the quality management system of BHEL but also it is desirable that they themselves are accredited under any quality management system standard. |
| **16.8.4.** | **Field Quality Assurance** |
| **16.8.4.1.** | Contractor shall carry out all activities conforming Field Quality Plan (FQP) as per requirement to be finalised at site, and as revised from time to time. Total quality shall be the watchword of the work and contractor shall strive to achieve the quality standards, procedures laid down by BHEL. He shall follow all the instructions as per BHEL drawings and quality standards. Contractor shall provide the services of quality assurance engineer as per the relevant clauses. |
| **16.9.** | **Health, Safety & Environment Obligations** |
| **16.9.1.** | **OCCUPATIONAL HEALTH, SAFETY & ENVIRONMENT MANAGEMENT/ QUALITY ASSURANCE PROGRAMME**:<br>BHEL, Power Sector Regions (PSNR / ER / WR / SR) are each certified for ISO 9001. Quality of work to customer's satisfaction and fulfillment of system requirements are the essence of ISO 9001 certification. BHEL, PS Regions have HSE certification (ISO 14001: 2015 & ISO 45001:2018) and therefore Contractor also shall organize / plan/ perform all their activities to meet with the applicable requirements of these standards. |
| **16.9.2.** | **HSE (Health, safety & Environment):**<br>Contractor will comply with HSE (Health, safety & Environment) requirements of BHEL as per the "HSE Plan for Site Operations by Subcontractor" and "Customer Safety requirements" issued along with tender. In case of conflict between any clause of these two documents stringent clause shall prevail. |
| **16.10.** | **RA Bill Payments** |
| **16.10.1.** | The contractor shall submit his monthly RA bills with all the details required by BHEL on specified date every month covering progress of work in all respects and areas for the previous calendar month prescribed format with clearance from HSE, Quality and HR. |
| **16.10.2.** | Mode of payment and measurement of work completed shall be as per relevant clauses of General Conditions of Contract |
| **16.10.3.** | Release of payment in each running bill including PVC Bills where ever applicable will be as per stages of progressive pro rata payments. |

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| **16.10.4.** | The payment for running bills will normally be released within 30 days of submission of running bill complete in all respects with all documents. It is the responsibility of the contractor to make his own arrangements for making timely payments towards labour wages, statutory payments, outstanding dues etc. and other dues in the meanwhile.<br><br>60% of RA Bills complete and correct in all respects and certified by BHEL Engineer, shall be paid within 15 days of receipt. Balance payment shall be within 30 days. |
| **16.10.5.** | BHEL shall release payment through Electronic Fund Transfer (EFT)/RTGS. In order to implement this system, Contractor to furnish details pertaining to his Bank Accounts where proceeds will be transferred through BHEL's banker, as per prescribed formats:<br><br>Note: BHEL may also choose to release payment by other alternative modes as applicable |
| **16.10.6.** | Paying Authority shall be the Construction Manager of the Site. Any change in the paying Authority shall be intimated to the Contactor accordingly. |

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| 17.0 | Following Technical Specifications shall be integral parts of this tender (attached separately): |
| 17.1 | Annexure-1-BHEL TnP Hire Charges |
| 17.2 | Annexure-2-Customer Safety requirements |
| 17.3 | Annexure-3-HSEP plan for Site Operations |
| 17.4 | Annexure-4-IP Camera Specification |
| 17.5 | Annexure-5-Gen. Layout arrangement Typ. Layout for workmen Shed |
| 17.6 | Annexure-6-Standard Guidelines for Worker's Accomodation at BHEL's Project Site |
| 17.7 | Annexure-7-TYP.LAYOUT FOR WORKMEN SHED |
| 17.8 | Annexure-8-TALABIRA - SECTION-B (PROJECT INFORMATION) |
| 17.9 | Annexure-9-Tentative Plot Plan PE-DG-511-100-M001_R02(TENDER STAGE DRAWING FOR BIDDER'S INFORMATION ONLY) |
| **NOTES:** | |
| 1 | Above documents have been uploaded separately. |

## Annexure-1: BHEL T&P Hire Charges

## Hire Charges on Issue of Capital Tools & Plants

1. The rates of hire charges for capital Tools and Plants and Operator's charges circulated vide letter No. PWR:FM: T&P Hire 2021-23 dated 31.08.2021 The Revised Rates effective from 25.09.2023 are enclosed as detailed below:

(i) Annexure C1 & T1: Rates of hire charges applicable to contractors working for BHEL

(ii) Annexure C2 & T2: Rates of hire charges applicable to outside agencies other than Contractors working for BHEL.

2. The Crane Operator's charges will be as follows:

   A. **If BHEL operator is utilised Rs. 9500/- (Rupees Nine thousand five hundred only) per day of 8 hours**. For services less than 4 hours, half of per day rate will be charged. For services for 4 hours or more but up to 8 hours, full day rate will be charged. Overtime Allowance (OTA) will be charged at double the rate on hourly basis.

   B. **If vendor sourced operator is provided, the rates shall be the actual cost to BHEL with 30% overheads.**

3. The hire charges of Capital Tools & Plants are exclusive of operating expenses e.g. fuel & consumables. **All Operating expenses are chargeable to User's account.**

4. All other terms and conditions / aspects governing the Issue of T&P on Hire "will remain the same as already circulated vide our letter of even number dated 22.1.1992 (copy enclosed).

5. **The revised rates will be effective from 25.09.2023 and shall remain valid up to 31.08.2025.** This will be subject to revision thereafter.

**Annexure**

**C1**

DATE:18/09/2023

REVISED RATES OF T&P HIRE CHARGES FOR CRANES & TRAILERS ETC. FOR
**SUB-CONTRACTORS WORKING FOR BHEL FOR DOING BHEL JOBS**

| SL NO. | ITEM DESCRIPTION | USEFUL LIFE (IN YRS) | Revised rates (Rs./Hour) valid from 25/09/2023 to 31/8/2025 (WITHIN USEFUL LIFE) | Revised rates (Rs./Hour) valid from 25/09/2023 to 31/8/2025 (BEYOND USEFUL LIFE) |
|---|---|---|---|---|
| I. | CRANES : - | | | |
| 1 | Portal Gantry Crane 500T | 15 | 26040.00 | 26040.00 |
| 2 | 100MT Crawler Crane ZOOMLION CRANE-QUY-100 | 10 | 11470.00 | 11470.00 |
| 3 | Heavy Lift Crawler Crane 600MT Class DEMAG Model CC2800 | 15 | 56920.00 | 56920.00 |
| 4 | PORTAL CRANE, 360T | 15 | 14230.00 | 14230.00 |
| 5 | 600MT Class Crawler Crane- Manitowoc Model 18000-UPGRADED | 15 | 56070.00 | 56070.00 |
| 6 | 600MT Class Crawler Crane- Liebherr Model LR1600-2 (Upgraded version) | 15 | 69370.00 | 69370.00 |
| 7 | CRAWLER CRANE FMC/LINKBELT 718, 250T (WITH RINGER) | 15 | 33880.00 | 33880.00 |
| 8 | CRAWLER CRANE FMC/LINKBELT 718, 250T (WITH-OUT RINGER) | 15 | 21170.00 | 21170.00 |
| 9 | MANITOWOC M-250T TRUCK CRANE | 15 | 30490.00 | 30490.00 |
| 10 | 270 MT Class Crawler Crane- Manitowoc Model 2250 | 15 | 32010.00 | 32010.00 |
| 11 | 300MT Crane Crawler Crane LIEBHERR Model LR-1350/1 | 15 | 26680.00 | 26680.00 |
| 11.A | 300MT Crane Crawler Crane LIEBHERR Model LR-1350/1 (UPGRADED) | 15 | 36740.00 | 36740.00 |
| 12 | 250MT Class Mid range Crawler Crane- Kobelco Model CKE2500-2 | 15 | 15290.00 | 15290.00 |
| 12.A | 250MT Class Mid range Crawler Crane- Kobelco Model CKE2500-2 (UPGRADED) | 15 | 19180.00 | 19180.00 |
| 13 | LINKBELT LS- 248H CRAWLER CRANE (180T) | 15 | 16940.00 | 16940.00 |
| 14 | MANITOWAC MODEL 888 CRAWLER CRANE (200 MT) | 15 | 22020.00 | 22020.00 |
| 15 | CRAWLER CRANE SUMITOMO, 150T | 15 | 11010.00 | 11010.00 |
| 16 | All Terrain Crane, 150MT- Liebherr Model LTM1150 | 15 | 13550.00 | 13550.00 |
| 17 | CRAWLER CRANE, 120 T Fushun Model QUY120 | 10 | 10920.00 | 10920.00 |
| 18.A | CRAWLER CRANE 135MT Kobelco Model CK1350- 1F | 15 | 10840.00 | 10840.00 |
| 18.B | CRAWLER CRANE 135MT Kobelco Model CK1350 | 15 | 8970.00 | 8970.00 |
| 19 | CRAWLER CRANE 120MT - Tata-Sumitomo Model SCX1200-2 | 15 | 10160.00 | 10160.00 |
| 20 | CRAWLER CRANE 100 T (KH 500) | 15 | 10160.00 | 10160.00 |
| 21 | Hydraulic Crawler Crane 80MT, Fushun Model QUY 80B | 10 | 5460.00 | 5460.00 |
| 22 | ROUGH TERRAIN CRANE 75T (RT880) | 12 | 6200.00 | 6200.00 |
| 23 | CRAWLER CRANE, 75T -Tata Model 955ALC/TFC280 | 12 | 5430.00 | 5430.00 |
| 24 | Mobile Crane, 55MT (TIL) | 12 | 4460.00 | 4460.00 |
| 25 | CRAWLER CRANE, 25T -Tata Model TFC75 | 10 | 3050.00 | 3050.00 |
| 26 | MOBILE CRANE, 20MT (TIL) | 10 | 2290.00 | 2290.00 |
| 27 | MOBILE CRANE, 20MT (ESCORTS) | 10 | 2290.00 | 2290.00 |
| 28 | MOBILE CRANE ESCORTS- 14MT | 10 | 720.00 | 720.00 |
| 29 | HYDAULIC PICK & CARRY CRANE, 8/9/10/11/12 MT | 10 | 390.00 | 390.00 |
| 30 | FORK LIFT 5T | 5 | 650.00 | 650.00 |
| 31 | FORK LIFT 3T | 5 | 540.00 | 540.00 |

Annexure C2 DATE:18/09/202

**REVISED RATES OF T&P HIRE CHARGES FOR CRANES & TRAILERS ETC. FOR OUTSIDE AGENCIES**

| SL NO. | ITEM DESCRIPTION | USEFUL LIFE (IN YRS) | Revised rates (Rs./Hour) valid from 25/09/2023 to 31/8/2025 (WITHIN USEFUL LIFE) | Revised rates (Rs./Hour) valid from 25/09/2023 to 31/8/2025 (BEYOND USEFUL LIFE) |
|---|---|---|---|---|
| I. | CRANES:- | | | |
| | | | | |
| 1 | Portal Gantry Crane 500T | 15 | 28930.00 | 28930.00 |
| 2 | 100MT Crawler Crane ZOOMLION CRANE-QUY-100 | 10 | 12740.00 | 12740.00 |
| 3 | Heavy Lift Crawler Crane 600MT Class DEMAG Model CC2800 | 15 | 63240.00 | 63240.00 |
| 4 | PORTAL CRANE, 360T | 15 | 15810.00 | 15810.00 |
| 5 | 600MT Class Crawler Crane- Manitowoc Model 18000-UPGRADED | 15 | 62300.00 | 62300.00 |
| 6 | 600MT Class Crawler Crane- Liebherr Model LR1600-2 (Upgraded version) | 15 | 77080.00 | 77080.00 |
| 7 | CRAWLER CRANE FMC/LINKBELT 718, 250T (WITH RINGER) | 15 | 37640.00 | 37640.00 |
| 8 | CRAWLER CRANE FMC/LINKBELT 718, 250T (WITH-OUT RINGER) | 15 | 23520.00 | 23520.00 |
| 9 | MANITOWOC M-250T TRUCK CRANE | 15 | 33880.00 | 33880.00 |
| 10 | 270 MT Class Crawler Crane- Manitowoc Model 2250 | 15 | 35570.00 | 35570.00 |
| 11 | 300MT Crane Crawler Crane LIEBHERR Model LR-1350/1 | 15 | 29640.00 | 29640.00 |
| 11.A | 300MT Crane Crawler Crane LIEBHERR Model LR-1350/1 (UPGRADED) | 15 | 40820.00 | 40820.00 |
| 12 | 250MT Class Mid range Crawler Crane- Kobelco Model CKE2500-2 | 15 | 16990.00 | 16990.00 |
| 12.A | 250MT Class Mid range Crawler Crane- Kobelco Model CKE2500-2 (UPGRADED) | 15 | 21310.00 | 21310.00 |
| 13 | LINKBELT LS- 248H CRAWLER CRANE (180T) | 15 | 18820.00 | 18820.00 |
| 14 | MANITOWAC MODEL 888 CRAWLER CRANE (200 MT) | 15 | 24470.00 | 24470.00 |
| 15 | CRAWLER CRANE SUMITOMO, 150T | 15 | 12230.00 | 12230.00 |
| 16 | All Terrain Crane, 150MT- Liebherr Model LTM1150 | 15 | 15050.00 | 15050.00 |
| 17 | CRAWLER CRANE, 120 T Fushun Model QUY120 | 10 | 12130.00 | 12130.00 |
| 18.A | CRAWLER CRANE 135MT Kobelco Model CK1350- 1F | 15 | 12040.00 | 12040.00 |
| 18.B | CRAWLER CRANE 135MT Kobelco Model CK1350 | 15 | 9970.00 | 9970.00 |
| 19 | CRAWLER CRANE 120MT - Tata-Sumitomo Model SCX1200-2 | 15 | 11290.00 | 11290.00 |
| 20 | CRAWLER CRANE 100 T (KH 500) | 15 | 11290.00 | 11290.00 |
| 21 | Hydraulic Crawler Crane 80MT, Fushun Model QUY 80B | 10 | 6060.00 | 6060.00 |
| 22 | ROUGH TERRAIN CRANE 75T (RT880) | 12 | 6890.00 | 6890.00 |
| 23 | CRAWLER CRANE, 75T -Tata Model 955ALC/TFC280 | 12 | 6030.00 | 6030.00 |
| 24 | Mobile Crane, 55MT (TIL) | 12 | 4950.00 | 4950.00 |
| 25 | CRAWLER CRANE, 25T -Tata Model TFC75 | 10 | 3390.00 | 3390.00 |
| 26 | MOBILE CRANE, 20MT (TIL) | 10 | 2540.00 | 2540.00 |
| 27 | MOBILE CRANE, 20MT (ESCORTS) | 10 | 2540.00 | 2540.00 |
| 28 | MOBILE CRANE ESCORTS- 14MT | 10 | 800.00 | 800.00 |
| 29 | HYDAULIC PICK & CARRY CRANE, 8/9/10/11/12 MT | 10 | 430.00 | 430.00 |
| 30 | FORK LIFT 5T | 5 | 730.00 | 730.00 |
| 31 | FORK LIFT 3T | 5 | 600.00 | 600.00 |

ANNEXURE-T I
DT: 18/09/2023

RATES OF T&P HIRE CHARGES FOR ITEMS OTHER THAN CRANES & TRAILERS ETC. FOR SUB-CONTRACTORS WORKING FOR BHEL FOR DOING BHEL JOBS

| SL NO. | ITEM DESCRIPTION | Revised rates (Rs./Day) valid from 25/09/2023 to 31/8/2025 |
|---|---|---|
| I. | LIFTING EQUIPMENTS | |
| | | |
| 1 | Strand Jack System for Boiler Drum Lifting | 21030 |
| 2 | MULTI SHEAVE PULLEY BLOCK 40/50T/60T | 310 |
| 3 | MULTI SHEAVE PULLEY BLOCK 100T | 630 |
| 4 | MULTI SHEAVE PULLEY BLOCK 150T | 1270 |
| 5 | ELCTRIC WINCH 5T | 1280 |
| 6 | ELCTRIC WINCH 10T | 2370 |
| 7 | ELECTRIC WINCH 15 T | 2170 |
| 8 | PASSENGER CUM GOODS HOIST 1T | 2290 |
| 9 | FURNACE MAINTENANCE PLATFORM | 5060 |
| 10 | Gang Operated Hydraulic Jack (Set of 4 Jacks - 175 MT each) | 2100 |
| | | |
| II | WELDING & HEAT TREATMENT EQUIPMENT | |
| 1 | 125KW, 3KHZ, AIR-COOLED INDUCTION HEATING EQUIPMENT | 16460 |
| 2 | 75KW, 10 KHZ, COMPACT INDUCTION HEATING EQUIPMENT | 8230 |
| 3 | WELDING GENERATOR 320/300 A | 300 |
| 4 | WELDING RECTIFIER 400A/300A | 300 |
| 5 | WELDING RECTIFIER 600A | 400 |
| 6 | DIESEL WELDING GENERATOR 400A/300A | 400 |
| 7 | TRANSFORMER,600A | 300 |
| 8 | TRANSFORMER 300/400A | 200 |
| | | |
| III | SERVICE PLANTS & ALLIED EQUIPT. | 0 |
| 1 | 500KVA DIESEL GENERATOR | 3830 |
| 2 | TRANSFORMER OIL FILTERATION EQUIPMENT 6000LPH CAPACITY WITHOUT STORAGE TANK | 6400 |
| 3 | -DO- , WITH STORAGE TANK | 7310 |
| 4 | OIL FILTERATION M/C, 250/500 LPH (OTHER THAN SILICON OIL) | 910 |
| 5 | OIL FILTERATION M/C, 250GPH/1000LPH (OTHER THAN SILICON OIL) | 1370 |
| 6 | OIL FILTERATION M/C, 500GPH/2500LPH (OTHER THAN SILICON OIL) | 1820 |
| 7 | OIL FILTERATION M/C, 1000GPH/5000LPH (OTHER THAN SILICON OIL) | 3650 |
| 8 | Portable Lube Oil Purification Unit (Centrifuge M/c) Capacity: 750 LPH | 1280 |
| 9 | Low Vacuum de-hydration unit | 640 |
| 10 | DIESEL GENERATING SET,250 KVA | 1780 |
| 11 | DIESEL GENERATING SET,25 KVA | 510 |
| 12 | VACUUM PUMP(ABSOLUTE V.C.) | 540 |
| 13 | ACID CIRCULATING PUMP WITH MOTOR 120M HEAD, 150T/HR | 1090 |
| 14 | ACID TRANSFER PUMP 20/50 T/HR | 540 |

RATES OF T&P HIRE CHARGES FOR ITEMS OTHER THAN CRANES & TRAILERS ETC. FOR SUB-CONTRACTORS WORKING FOR BHEL FOR DOING BHEL JOBS

| SL NO. | ITEM DESCRIPTION | Revised rates (Rs./Day) valid from 25/09/2023 to 31/8/2025 |
|---|---|---|
| 15 | DEWATERING PUMP (Kirloskar make,11KW/15HP) | 80 |
| 16 | HP Air compressor (32 Kg/Sq. Cm, 150 CFM) | 4260 |
| 17 | AIR COMPRESSORS 250/300/330/360/350 CFM | 2740 |
| 18 | AIR COMPRESSORS 140/150/190/210 CFM | 910 |
| 19 | ACID CIRCULATING PUMP WITH MOTOR & STARTER, 200T/HR, 150M, 220 HP | 1820 |
| 20 | Industrial Blower 2000CFM | 1280 |
| 21 | Air Leak Test Blower (Flow: 40000 $m^3$/Hr) | 1160 |
| 22 | Air Blower (Flow: 20000 $m^3$/Hr) | 940 |
| | | |
| IV | METAL FORMING /CUTTING EQUIPMENT | |
| 1 | TUBE EXPANDING M/C PNEUMATIC 60-100 MM | 640 |
| 2 | ELECTRO HYDRAULIC PIPE BENDING M/C 4" | 1640 |
| 3 | BOLTING MACHINE (ALCOA/AVLOCK/ HUCK) | 1810 |
| 4 | -do- Gun with nose Assembly only | 540 |
| | | |
| V | TESTING/INSPECTION EQUIPMENT | |
| 1 | DATA LOGGER for PG TESTING | 37110 |
| 2 | MOTORISED HYDRAULIC TEST PUMP 250kg/cmsq | 800 |
| 3 | MOTORISED HYDRAULIC TEST PUMP 400-450kg/cmsq | 1090 |
| 4 | MOTORISED HYDRAULIC TEST PUMP 600 KG/CMSQ | 1280 |
| 5 | HYDRAULIC TEST PUMP 800 KG/CMSQ | 1340 |
| 6 | HYDRAULIC TEST PUMP 1000 KG/CMSQ | 2250 |
| 7 | BOLT STRETCHING DEVICE | 910 |
| 8 | BOROSCOPE/FIBROSCOPE FLEXIBLE TYPE (FLEXUX) IMPORTED | 3650 |
| 9 | ULTRASONIC FLAW DETECTOR | 2740 |
| 10 | MPI TEST KIT | 360 |
| 11 | GAS LEAK DETECTOR | 270 |
| 12 | VIBRATION/SOUND LEVEL METER IRD-306 | 360 |
| 13 | VIBRATION/SOUND LEVEL METER IRD-308 | 360 |
| 14 | VIBRATION ANALYSER/DYNAMIC BALANCING M/C IRD 350 | 1460 |
| 15 | VIBRATION ANALYSER/DYNAMIC BALANCING M/C IRD 360 | 2560 |
| 16 | SHOCK PULSE METER | 640 |
| 17 | HV.DC TEST KIT UPTO 50 KV | 540 |
| 18 | HV.DC TEST KIT ABOVE 50 KV | 1000 |
| 19 | HV.AC TEST KIT UPTO 50KV | 820 |
| 20 | HV.AC TEST KIT ABOVE 50KV | 2920 |
| 21 | MOTORISED MEGGER 2.5KV | 400 |
| 22 | MOTORISED MEGGAR 5KV | 450 |
| 23 | OSCILLOSCOPE-DUAL BEAM INDIGENOUS | 450 |
| 24 | OSCILLOSCOPE-DUAL BEAM IMPORTED | 1090 |
| 25 | WAVEFORM ANALYSER | 910 |
| 26 | OSCILLOGRAPH/UV RECORDER 24 CHANNEL | 1640 |
| 27 | OSCILLOGRAPH/UV RECORDER 12 CHANNEL | 1090 |
| 28 | OSCILLOGRAPH/UV RECORDER 6 CHANNEL | 910 |
| 29 | DIGITAL LOW RESISTANCE METER | 640 |
| 30 | DC POTENTIOMETER | 180 |
| 31 | PRECISION DEAD WEIGHT TESTER | 1000 |
| 32 | OPTICAL ALIGNMENT KIT | 1370 |
| 33 | BOROSCOPE/FIBROSCOPE(NON FLEXIBLE) | 1200 |
| 34 | VERNIER THEODOLITE,PRECISION | 1200 |
| 35 | VERNIER THEODOLITE,ORDINARY | 200 |
| 36 | ENGINEERS PRECISION LEVEL/DUMPY LEVEL | 120 |

RATES OF T&P HIRE CHARGES FOR ITEMS OTHER THAN CRANES & TRAILERS ETC. FOR SUB-CONTRACTORS WORKING FOR BHEL FOR DOING BHEL JOBS

| SL NO. | ITEM DESCRIPTION | Revised rates (Rs./Day) valid from 25/09/2023 to 31/8/2025 |
|---|---|---|
| 37 | ISKAMATIC 'A' | 3210 |
| 38 | CALIBRATOR '03' | 1000 |
| 39 | 48 POLE EXTENDER CARD | 200 |
| 40 | MULTIJET NPM | 400 |
| 41 | OSCILLOMETER | 10240 |
| 42 | VOC EQUIPMENT | 1400 |
| 43 | BINARY SIGNAL GENERATOR | 290 |
| 44 | ELECTRIC COUNTER | 690 |
| 45 | FREQUENCY GENERATOR | 1000 |
| 46 | DBF 3 VIBRATION RECORDER/ANALYSER | 3290 |
| 47 | L&T GOULD OSCILLOGRAPH 2-CHANNEL | 490 |
| 48 | L&T GOULD OSCILLOGRAPH 6-CHANNEL | 1180 |
| 49 | VIBROPORT 41/FFT ANALYSER | 5480 |
| 50 | ELCID kit | 10060 |
| 51 | UNIVERSAL CALIBRATION SYSTEM | 2740 |
| 52 | NATURAL FREQUENCY TESTER | 2920 |
| 53 | DIGITAL HARDNESS TESTER | 360 |
| 54 | ADRE 208 VIBRATION ANALYSER | 7310 |
| 55 | PCB DIAGONISTIC REPAIR KIT | 2010 |
| 56 | SECONDARY INJECTION RELAY TEST KIT | 5300 |
| 57 | MICRO OHM METER | 1460 |
| 58 | DIGITAL MICRO OHM METER<br>MEASURING RANGE: 200 μΩ TO 20KΩ | 3250 |
| 59 | PMI Machine OLYMPUS make | 3370 |
| 60 | Mobile Lighting Mast -<br>9 metres (4X400 W) | 870 |
| 61 | 10KVA RESISTANCE BRAZING MACHINE | 140 |
| 62 | RECURRENT SURGE OSCILLOGRAPH (RSO) TEST KIT WITH PORTABLE HANDHELD OSCILLOSCOPE. | 460 |
| 63 | HYDROGEN GAS LEAK DETECTOR | 60 |
| 64 | STATOR WEDGE ANALYZER KIT WITH COMPLETE ACCESSORIES | 5020 |
| 65 | WEDGE DEFLECTION KIT | 80 |
| 66 | TILE PRESSING MACHINE FOR GAS TURBINE | 270 |
| 67 | INDUCTION BRAZING MACHINE | 4910 |
| 68 | MAGNETIC COHESIVE FORCE (MCF) EQUIPMENT | 3650 |
| 69 | ULTRASONIC FLOW METER | 180 |
| 70 | PORTABLE VIBRATION ANALYSER (MODEL 811T) | 40 |
| 71 | CENTRIFUGAL PUMP SET FOR ACID CLEANING (WITH MOTOR AND PANEL) : PRESSURE -14KG/SQ CM. ; FLOW 60 M3/HR | 470 |
| 72 | CENTRIFUGAL PUMP SET FOR ACID CLEANING (WITH MOTOR AND PANEL) : PRESSURE -30KG/SQ CM. ; FLOW 15 M3/HR | 430 |
| 73 | HI SPEED MEMORY RECORDER, MAKE -YOKOGAWA, MODEL DL850E-Q-HE/B5/HD1 | 1820 |
| 74 | TROLLEY MOUNTED HYDRAULIC JACK (100 MT) | 1260 |
| 75 | 5KV Insulation Tester | 450 |
| 76 | 4 Channel Digital Oscilloscope /Fast Recorder | 1720 |
| 77 | 4 Channel Oscillographic Recorder | 590 |
| 78 | Sound Level Meter | 230 |
| 79 | Thermal Imaging Camera | 780 |
| 80 | Videoscope (Video Boroscope) | 1530 |
| 81 | DO (Dissolve Oxygen) Meter (0 to 1500 ppb) | 1320 |
| 82 | Conductivity Meter | 80 |
| 83 | Core Flux Test Kit | 7340 |
| 84 | Primary Current Injection Kit (2000A) | 870 |

RATES OF T&P HIRE CHARGES FOR ITEMS OTHER THAN CRANES & TRAILERS ETC. FOR SUB-CONTRACTORS WORKING FOR BHEL FOR DOING BHEL JOBS

| SL NO. | ITEM DESCRIPTION | Revised rates (Rs./Day) valid from 25/09/2023 to 31/8/2025 |
|---|---|---|
| 85 | 3 Phase Secondary Injection Kit ( Relay Test ) | 3790 |
| 86 | FRF Filtration Kit | 1340 |
| 87 | FFT Analyser | 2310 |
| 88 | Flue Gas Analyser | 1030 |
| 89 | Oil Test Kit ( Mineral Oil)-Transformer | 1020 |
| 90 | Winding Resistance kit ( R L C Load) | 880 |
| 91 | SFRA test Kit | 1200 |
| 92 | Tan Delta test Kit | 4090 |
| 93 | PF Meter | 330 |
| 94 | Ultrasonic Flow Meter | 840 |
| 95 | Oil Particle Counter | 360 |
| 96 | Plasma Cutting Machine (With complete accessories) | 320 |
| 97 | JCB make DG Set 80 KVA | 690 |
| 98 | Diesel Generating Set 82.5 KVA | 640 |
| 99 | Portable Jacking Oil Pump | 1110 |
| 100 | Alloy Analyser | 1820 |

ANNEXURE-T II
DT: 18/09/2023

# RATES OF T & P HIRE CHARGES FOR ITEMS OTHER THAN CRANES & TRAILLERS ETC. FOR OUTSIDE AGENCIES

| SL NO. | ITEM DESCRIPTION | Revised rates (Rs./Day) valid from 25/09/2023 to 31/8/2025 |
|---|---|---|
| I. | LIFTING EQUIPMENTS | |
| | | |
| 1 | Strand Jack System for Boiler Drum Lifting | 23370 |
| 2 | MULTI SHEAVE PULLEY BLOCK 40/50T/60T | 350 |
| 3 | MULTI SHEAVE PULLEY BLOCK 100T | 700 |
| 4 | MULTI SHEAVE PULLEY BLOCK 150T | 1410 |
| 5 | ELCTRIC WINCH 5T | 1420 |
| 6 | ELCTRIC WINCH 10T | 2640 |
| 7 | ELECTRIC WINCH 15 T | 2410 |
| 8 | PASSENGER CUM GOODS HOIST 1T | 2540 |
| 9 | FURNACE MAINTENANCE PLATFORM | 5620 |
| 10 | Gang Operated Hydraulic Jack (Set of 4 Jacks - 175 MT each) | 2340 |
| | | |
| II | WELDING & HEAT TREATMENT EQUIPMENT | |
| 1 | 125KW, 3KHZ, AIR-COOLED INDUCTION HEATING EQUIPMENT | 18290 |
| 2 | 75KW, 10 KHZ, COMPACT INDUCTION HEATING EQUIPMENT | 9140 |
| 3 | WELDING GENERATOR 320/300 A | 330 |
| 4 | WELDING RECTIFIER 400A/300A | 330 |
| 5 | WELDING RECTIFIER 600A | 440 |
| 6 | DIESEL WELDING GENERATOR 400A/300A | 440 |
| 7 | TRANSFORMER,600A | 330 |
| 8 | TRANSFORMER 300/400A | 220 |
| | | |
| III | SERVICE PLANTS & ALLIED EQUIPT. | |
| 1 | 500KVA DIESEL GENERATOR | 4250 |
| 2 | TRANSFORMER OIL FILTERATION EQUIPMENT 6000LPH CAPACITY WITHOUT STORAGE TANK | 7110 |
| 3 | -DO- , WITH STORAGE TANK | 8130 |
| 4 | OIL FILTERATION M/C, 250/500 LPH (OTHER THAN SILICON OIL) | 1010 |
| 5 | OIL FILTERATION M/C, 250GPH/1000LPH (OTHER THAN SILICON OIL) | 1520 |
| 6 | OIL FILTERATION M/C, 500GPH/2500LPH (OTHER THAN SILICON OIL) | 2030 |
| 7 | OIL FILTERATION M/C, 1000GPH/5000LPH (OTHER THAN SILICON OIL) | 4060 |
| 8 | Portable Lube Oil Purification Unit (Centrifuge M/c) Capacity: 750 LPH | 1420 |
| 9 | Low Vacuum de-hydration unit | 710 |
| 10 | DIESEL GENERATING SET,250 KVA | 1980 |
| 11 | DIESEL GENERATING SET,25 KVA | 560 |
| 12 | VACUUM PUMP(ABSOLUTE V.C.) | 600 |
| 13 | ACID CIRCULATING PUMP WITH MOTOR 120M HEAD, 150T/HR | 1210 |
| 14 | ACID TRANSFER PUMP 20/50 T/HR | 600 |
| 15 | DEWATERING PUMP (Kirloskar make,11KW/15HP) | 90 |
| 16 | HP Air compressor (32 Kg/Sq. Cm, 150 CFM) | 4730 |
| 17 | AIR COMPRESSORS 250/300/330/360/350 CFM | 3040 |
| 18 | AIR COMPRESSORS 140/150/190/210 CFM | 1010 |
| 19 | ACID CIRCULATING PUMP WITH MOTOR & STARTER, 200T/HR, 150M, 220 HP | 2030 |
| 20 | Industrial Blower 2000CFM | 1420 |
| 21 | Air Leak Test Blower (Flow: 40000 $m^3$/Hr) | 1290 |
| 22 | Air Blower (Flow: 20000 $m^3$/Hr) | 1050 |

ANNEXURE-T II
DT: 18/09/2023

# RATES OF T & P HIRE CHARGES FOR ITEMS OTHER THAN CRANES & TRAILLERS ETC. FOR OUTSIDE AGENCIES

| SL NO. | ITEM DESCRIPTION | Revised rates (Rs./Day) valid from 25/09/2023 to 31/8/2025 |
|---|---|---|
| | | |
| IV | METAL FORMING /CUTTING EQUIPMENT | |
| 1 | TUBE EXPANDING M/C PNEUMATIC 60-100 MM | 710 |
| 2 | ELECTRO HYDRAULIC PIPE BENDING M/C 4" | 1820 |
| 3 | BOLTING MACHINE (ALCOA/AVLOCK/ HUCK) | 2010 |
| 4 | -do- Gun with nose Assembly only | 600 |
| | | |
| V | TESTING/INSPECTION EQUIPMENT | |
| 1 | DATA LOGGER for PG TESTING | 41230 |
| 2 | MOTORISED HYDRAULIC TEST PUMP 250kg/cmsq | 890 |
| 3 | MOTORISED HYDRAULIC TEST PUMP 400-450kg/cmsq | 1210 |
| 4 | MOTORISED HYDRAULIC TEST PUMP 600 KG/CMSQ | 1420 |
| 5 | HYDRAULIC TEST PUMP 800 KG/CMSQ | 1490 |
| 6 | HYDRAULIC TEST PUMP 1000 KG/CMSQ | 2490 |
| 7 | BOLT STRETCHING DEVICE | 1010 |
| 8 | BOROSCOPE/FIBROSCOPE FLEXIBLE TYPE (FLEXUX) IMPORTED | 4060 |
| 9 | ULTRASONIC FLAW DETECTOR | 3040 |
| 10 | MPI TEST KIT | 400 |
| 11 | GAS LEAK DETECTOR | 300 |
| 12 | VIBRATION/SOUND LEVEL METER IRD-306 | 400 |
| 13 | VIBRATION/SOUND LEVEL METER IRD-308 | 400 |
| 14 | VIBRATION ANALYSER/DYNAMIC BALANCING M/C IRD 350 | 1620 |
| 15 | VIBRATION ANALYSER/DYNAMIC BALANCING M/C IRD 360 | 2840 |
| 16 | SHOCK PULSE METER | 710 |
| 17 | HV.DC TEST KIT UPTO 50 KV | 600 |
| 18 | HV.DC TEST KIT ABOVE 50 KV | 1110 |
| 19 | HV.AC TEST KIT UPTO 50KV | 910 |
| 20 | HV.AC TEST KIT ABOVE 50KV | 3250 |
| 21 | MOTORISED MEGGER 2.5KV | 440 |
| 22 | MOTORISED MEGGAR 5KV | 500 |
| 23 | OSCILLOSCOPE-DUAL BEAM INDIGENOUS | 500 |
| 24 | OSCILLOSCOPE-DUAL BEAM IMPORTED | 1210 |
| 25 | WAVEFORM ANALYSER | 1010 |
| 26 | OSCILLOGRAPH/UV RECORDER 24 CHANNEL | 1820 |
| 27 | OSCILLOGRAPH/UV RECORDER 12 CHANNEL | 1210 |
| 28 | OSCILLOGRAPH/UV RECORDER 6 CHANNEL | 1010 |
| 29 | DIGITAL LOW RESISTANCE METER | 710 |
| 30 | DC POTENTIOMETER | 200 |
| 31 | PRECISION DEAD WEIGHT TESTER | 1110 |
| 32 | OPTICAL ALIGNMENT KIT | 1520 |
| 33 | BOROSCOPE/FIBROSCOPE(NON FLEXIBLE) | 1340 |
| 34 | VERNIER THEODOLITE,PRECISION | 1340 |
| 35 | VERNIER THEODOLITE,ORDINARY | 220 |
| 36 | ENGINEERS PRECISION LEVEL/DUMPY LEVEL | 130 |
| 37 | ISKAMATIC 'A' | 3570 |
| 38 | CALIBRATOR '03' | 1110 |
| 39 | 48 POLE EXTENDER CARD | 220 |
| 40 | MULTIJET NPM | 440 |
| 41 | OSCILLOMETER | 11380 |
| 42 | VOC EQUIPMENT | 1560 |
| 43 | BINARY SIGNAL GENERATOR | 320 |
| 44 | ELECTRIC COUNTER | 770 |

ANNEXURE-T II
DT: 18/09/2023

# RATES OF T & P HIRE CHARGES FOR ITEMS OTHER THAN CRANES & TRAILLERS ETC. FOR OUTSIDE AGENCIES

| SL NO. | ITEM DESCRIPTION | Revised rates (Rs./Day) valid from 25/09/2023 to 31/8/2025 |
|---|---|---|
| 45 | FREQUENCY GENERATOR | 1110 |
| 46 | DBF 3 VIBRATION RECORDER/ANALYSER | 3650 |
| 47 | L&T GOULD OSCILLOGRAPH 2-CHANNEL | 540 |
| 48 | L&T GOULD OSCILLOGRAPH 6-CHANNEL | 1320 |
| 49 | VIBROPORT 41/FFT ANALYSER | 6090 |
| 50 | ELCID kit | 11170 |
| 51 | UNIVERSAL CALIBRATION SYSTEM | 3040 |
| 52 | NATURAL FREQUENCY TESTER | 3250 |
| 53 | DIGITAL HARDNESS TESTER | 400 |
| 54 | ADRE 208 VIBRATION ANALYSER | 8130 |
| 55 | PCB DIAGONISTIC REPAIR KIT | 2230 |
| 56 | SECONDARY INJECTION RELAY TEST KIT | 5890 |
| 57 | MICRO OHM METER | 1620 |
| 58 | DIGITAL MICRO OHM METER<br>MEASURING RANGE: 200 μΩ TO 20KΩ | 3610 |
| 59 | PMI Machine OLYMPUS make | 3740 |
| 60 | Mobile Lighting Mast -<br>9 metres (4X400 W) | 970 |
| 61 | 10KVA RESISTANCE BRAZING MACHINE | 160 |
| 62 | RECURRENT SURGE OSCILLOGRAPH (RSO) TEST KIT WITH PORTABLE HANDHELD OSCILLOSCOPE. | 520 |
| 63 | HYDROGEN GAS LEAK DETECTOR | 60 |
| 64 | STATOR WEDGE ANALYZER KIT WITH COMPLETE ACCESSORIES | 5580 |
| 65 | WEDGE DEFLECTION KIT | 90 |
| 66 | TILE PRESSING MACHINE FOR GAS TURBINE | 300 |
| 67 | INDUCTION BRAZING MACHINE | 5460 |
| 68 | MAGNETIC COHESIVE FORCE (MCF) EQUIPMENT | 4060 |
| 69 | ULTRASONIC FLOW METER | 200 |
| 70 | PORTABLE VIBRATION ANALYSER (MODEL 811T) | 50 |
| 71 | CENTRIFUGAL PUMP SET FOR ACID CLEANING (WITH MOTOR AND PANEL) : PRESSURE -14KG/SQ CM. ; FLOW 60 M3/HR | 520 |
| 72 | CENTRIFUGAL PUMP SET FOR ACID CLEANING (WITH MOTOR AND PANEL) : PRESSURE -30KG/SQ CM. ; FLOW 15 M3/HR | 480 |
| 73 | HI SPEED MEMORY RECORDER, MAKE -YOKOGAWA, MODEL DL850E-Q-HE/B5/HD1 | 2020 |
| 74 | TROLLEY MOUNTED HYDRAULIC JACK (100 MT) | 1400 |
| 75 | 5KV Insulation Tester | 500 |
| 76 | 4 Channel Digital Oscilloscope /Fast Recorder | 1910 |
| 77 | 4 Channel Oscillographic Recorder | 650 |
| 78 | Sound Level Meter | 260 |
| 79 | Thermal Imaging Camera | 870 |
| 80 | Videoscope (Video Boroscope) | 1700 |
| 81 | DO (Dissolve Oxygen) Meter (0 to 1500 ppb) | 1470 |
| 82 | Conductivity Meter | 90 |
| 83 | Core Flux Test Kit | 8160 |
| 84 | Primary Current Injection Kit (2000A) | 970 |
| 85 | 3 Phase Secondary Injection Kit ( Relay Test ) | 4210 |
| 86 | FRF Filtration Kit | 1490 |
| 87 | FFT Analyser | 2570 |
| 88 | Flue Gas Analyser | 1150 |
| 89 | Oil Test Kit ( Mineral Oil)-Transformer | 1130 |
| 90 | Winding Resistance kit ( R L C Load) | 980 |

ANNEXURE-T II
DT: 18/09/2023

# RATES OF T & P HIRE CHARGES FOR ITEMS OTHER THAN CRANES & TRAILLERS ETC. FOR OUTSIDE AGENCIES

| SL NO. | ITEM DESCRIPTION | Revised rates (Rs./Day) valid from 25/09/2023 to 31/8/2025 |
|---|---|---|
| 91 | SFRA test Kit | 1330 |
| 92 | Tan Delta test Kit | 4550 |
| 93 | PF Meter | 370 |
| 94 | Ultrasonic Flow Meter | 930 |
| 95 | Oil Particle Counter | 400 |
| 96 | Plasma Cutting Machine (With complete accessories) | 350 |
| 97 | JCB make DG Set 80 KVA | 770 |
| 98 | Diesel Generating Set 82.5 KVA | 710 |
| 99 | Portable Jacking Oil Pump | 1230 |
| 100 | Alloy Analyser | 2030 |

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## Annexure-2: Customer Safety requirements

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## ANNEXURE-XIX

## SAFETY CODE FOR CONTRACTORS

### 1.0 GENERAL

1.1 Safety is the responsibility of every employee, individually and collectively.

1.2 Head of the Dept/Division should ensure that a copy of this Contractor's Safety Code is handed over to every Contractor working under his control and he should in turn prominently display all rules on the office/site notice board for the benefit of all the men working under him.

1.3 The Contractor shall in connection with provide adequate guards, illumination, fencing and watch wherever necessary at the construction site & working area, for the safety & convenience of general public.

1.4 Fire extinguishers adequate in number and with proper validity shall always be kept by the Contractor at the site of works, where there is risk of fire hazard, especially near the site stores.

1.5 Adequate washing facilities with proper drainage shall be provided and properly maintained near the place of work but at a safe distance from railway tracks and busy roads.

1.6 Whenever work is to be undertaken near a place, where there is a risk of drowning, arrangements to be made for safe barricading of such areas. All necessary equipment shall be provided and kept ready for use and necessary steps taken for prompt rescue of any person in danger and adequate provision shall be made for prompt first-aid treatment of all injuries likely to be sustained during the course of the work, in case of a mishap.

1.7 To ensure effective enforcement of the rules and regulations relating to safety precautions, the arrangements made by the Contractor shall be open to inspection by

the Safety Engineer, the Labour Officer, Engineer-in-charge of the concerned Department or their representatives.

1.8 Notwithstanding the above clauses, there is nothing in these to exempt the Contractor from the operation of any other Act or Rule in the Republic of India for the safety of men and materials.

1.9 An injury sustained in the plant, must be immediately reported to the First-Aid Station or next higher Supervisor/Officer in-charge, no matter how minor the nature of the injury.

1.10 In case of a fatal accident, the Contractor must inform the Engineer in-charge of the department for which he is working and a report in writing should be made, clearly explaining the sequence of events leading to the accident.

1.11 Smoking or use of naked lights is strictly prohibited near gas lines, valves and any other equipment linked to the gas distribution networks.

1.12 Smoking and carrying of matches, lighters and other spark producing devices is strictly prohibited within the area where inflammable liquids are stored, handled or used or where loading or unloading operations are performed. Any tank or container containing inflammable liquid should be properly grounded for preventing ignition due to static electricity charges. Contractor should ear-mark such areas and provide necessary signage and warning signals.

1.13 Contractors should ensure that employees do not report to work while under the influence of intoxicants. Any employee found on duty under the influence of liquor or of intoxicating drugs, will be liable to severe disciplinary action.

1.14 Work surroundings should be kept clean, free from oil, grease and other obstructions or fallen objects like nuts bolts etc.

1.15 After a job or work is completed, all left-over junk and other scrap materials should be cleared from the area immediately.

1.16 Drums or other make-shift arrangement must not be used in place of ladders or as work benches or supports for any job.

1.17 Employees shall not walk through or cross any operating units unless their duties require them to do so, or they are authorised.

1.18 Compressed air should not be used for removing dust from one's clothes and deliberately directed or used on any person as it is likely to cause serious injury.

1.19 If an employee, in the course of his work, encounters conditions of unusual hazard with which he is not familiar, he should contact the supervisor for advice before proceeding further. He should also inform the Contractor as well as the Engineer in-charge.

1.20 Contractors should particularly ensure that they or their employees do not meddle with any equipment they are not concerned or unfamiliar with and see that they should generally keep away from such equipment.

1.21 It should be ensured that no one takes rest/shelter below any under cut pit/excavation or near any stock-pile of materials.

1.22 For any work involving repair & maintenance underground, the Contractor shall follow the safety procedural orders/instruction issued by the Purchaser.

1.23 The Contractor shall ensure supervision of such jobs by competent persons within the meaning of Factories Act & Rules.

1.24 All persons engage on such jobs shall have to have before hand proper training instructions as required under Factories Act & Rules.

## 2.0 SAFETY MEASURES IN CONTRACT WORK

Whereas, it is necessary to take steps to ensure safety at work sites by the executing contractual agency, it is incumbent of the Purchaser to introduce all measures to guide, induce, train and bind the agencies concerned to adopt remedial steps to

prevent accidents. Problem gets aggravated in contractual zones due to lack of training, in-adequate supply of personal protective equipment, shortage of skilled labour changing deployment of works etc. Accordingly, the following measures are intended to be introduced and the salient clauses will be included in the contract documents.

2.1 The Contractor shall take all safety precautions and provide adequate supervision in order to carry out the job safely and without damage to men & equipment.

2.2 Any special safety precautions, if required to be followed by the Contractor, such clauses shall be added.

2.3 The executing department would take necessary shut-downs wherever there are hazards of gases, electricity, moving machinery etc. The Contractor shall ensure that the shut-down/clearance are taken before deploying workers to such locations.

2.4 The Contractor shall supply safety appliance such as safety shoes, safety belts, helmets, gloves, harness etc. to his workers depending on working conditions and life saving jackets shall always be kept in readiness at the site. The Contractor shall not deploy any workmen without safety shoes and safety helmet and the safety applicable to the specific work conditions.

2.5 Before starting the day's job, the Purchaser's Supervisor/representatives will ensure that safety briefing has been done to the Contractor's supervisor who has previously been imparted safety induction training.

2.6 Head/Zonal in-charge will nominate Engineer in-charge of the contractual work under reference who will be fully responsible for the safe execution of the work at site.

2.7 In case of injury to persons, the Contractors shall first take the injured person to nearest hospital with the necessary forms. In no case the Contractors are allowed to take injured persons directly to their own Doctors.

2.8 The Contractor shall abide by the provisions of Factories Act, State Factory Rules, Workmen's Compensation Act, Payment of Wages Act, Contract Labour (Regulation)

Act etc., and keep the Purchaser indemnified of provision the above Acts and Rules.

2.9 The Head of Department. executing the contract upon the satisfaction that the Contractor is not conforming to the Safety requirements may direct stoppage of work and require the Contractor to remedy the defects. The Contractor shall not proceed with the work until he has complied with each directions to the satisfaction of such Head of the Department.

2.10 The Contractor shall be fully responsible for accidents caused due to him or his agents or workmen's negligence or carelessness in regard to the observance of the safety requirements and shall be liable to pay compensation for injuries.

2.11 Without prejudice to the right conferred by the above clause, for stoppage of work for violations of safety requirements the Contractor shall be liable for penalty as deemed fit for violation of safety rules & regulations upto first two instances. For the third violation he shall be liable to be debarred from further contracts upto a period of one year from the date of issue of debarring notice.

2.12 The Head of the Safety Engg. Deptt. or the Head of the Deptt. executing the contract will assess the penalty amount having regard to the circumstances, in particular, the nature and gravity of the violation. After issuing a notice to the Contractor to show cause why the amount specified therein shall not be imposed as a penalty and considering the cause shown by the Contractors, if any, he shall pass final orders which shall then be final and binding on the Contractor. The penalty amount will be recoverable from any bill and/or EMD/SD of the Contractor without any further reference to him.

2.13 Whenever work, at heights is involved, Contractor must obtain necessary permissions and clearances from the Safety Engg. Dept. for such persons required to do work at height.

2.14 Contractor must insure all the workmen under the "Workmen Compensation Act."

2.10.17 Before erection of any equipment on a foundation, the Bidder shall check and undertake if necessary rectification of foundation bolts, reaming of holes, drilling of dowels, matching of bolts and nuts, making new dowel pin, etc.

2.10.18 Assistance for calibrating/testing the power cylinders, valves, gauges, instruments, etc., and setting of actuators coming under various groups shall be provided by Bidder.

2.10.19 It shall be the responsibility of the Bidder to provide ladders on columns for initial works till such time stairways are completed. For this, the ladder should not be welded on the column and should be prefabricated clamping type. No temporary welding on any structural member is permitted except under special circumstances with the approval of Owner.

2.10.20 Structural materials required for the supporting/operating platforms required for the valves at various levels for the safe operation of valves will be arranged by the Bidder.

2.10.21 For civil, structural and architectural works, Volume II-G/1 & II-G/2 may be referred. For Instrumentation and Electrical works, Volume. II-E and Volume. II-F/1 & F/2 may be referred.

2.11.00 **Safety**

2.11.01 Safety and overall cleanliness of work site shall be given top priority. The Bidder shall ensure the safety of all workmen, materials and equipment either belonging to him or to others working at site. He shall observe safety rules & codes applied by the Owner at site without exception.

2.11.02 The Bidder shall notify the Owner of his intention to bring to site any equipment or material which may create hazard. The Owner shall have the right to prescribe the conditions under which such equipment or material may be handled and the Bidder shall adhere to such instructions. The Owner may prohibit the use of any construction machinery, which according to him is unsafe. No claim for compensation due to such prohibition will be entertained by the Owner.

2.11.03 Storage of petroleum products & explosives for construction work shall be as per rules and regulation laid down in Petroleum Act, Explosive Act and Petroleum and Carbide of Calcium Manual. Approvals as necessary from Chief Inspector of Explosives or other statutory authorities shall be the responsibility of the Bidder.

2.11.04 The Bidder shall be responsible for safe storage of his and his sub-Bidder's radioactive sources.

2.11.05 All requisite tests & inspection of handling equipment, lifting tools & tackle shall be periodically done by the Bidder. Defective equipment shall be removed from service. Any equipment shall not be loaded in excess of its recommended safe working load.

2.11.06 All combustible waste and rubbish shall be collected and removed from the worksite at least once each day. Use of undercoated canvas paper, corrugated paper, fabricated carton, plastic or other flammable materials shall be restricted to the minimum and promptly removed.

2.11.07 The Bidder shall provide adequate number of fire protection equipment of the required types for his stores, office, temporary structures, labour colony etc. Personnel trained for fire-fighting shall be made available by the Bidder at site during the entire period of the Contract.

2.11.08 All electrical appliances used in the work shall be in good working condition and shall be properly earthed. No maintenance work shall be carried out on live equipment. The Bidder shall maintain adequate number of qualified electricians to maintain his temporary electrical installation.

2.11.09 All workmen of the Bidder working in construction site shall wear safety helmets, safety boots and safety belts. The Bidder shall take appropriate insurance cover against accidents for his workmen as well as third party.

2.11.10 All the worksites shall be provided with adequate lighting facilities e.g. flood lighting, hand lamps, area lighting etc. by the Bidder for proper working environment during night times.

2.11.11 Adequate number of temporary toilets/urinals (men & women separate) shall be provided at work places with soak pits. Adequate drinking water facilities and rest rooms shall be provided for workers to take food and rest.

2.11.12 All safety precautions shall be taken for welding and cutting operations as per IS-818.

2.11.13 All safety precautions shall be taken for foundation and other excavation marks as per IS-3764.

2.12.00 **Taking Delivery & Storage**

2.12.01 The Bidder shall arrange issue of all equipment and materials to be erected under the contract from the stores/open yard at site by signing on standard indent forms. After completion of work, detailed auditing of the materials so issued shall be submitted to the Owner.

2.12.02 The Bidder shall arrange for proper and safe storage of materials till the same are taken over by the Owner as per terms of the contract. Manufacturer's instructions for preservation shall be strictly followed.

2.12.03 All empty containers, packing materials, gunny bags, transport frames and also surplus and unused materials reconciliation prior to completion of contract shall be dealt as per clause 2.12.0 Section – 2 of Vol IB.

# VOLUME: II-G/2
# PART-B

# SECTION-XIX

# GUIDELINE
# FOR
# SAFETY REQUIREMENTS FOR CONSTRUCTION WORKS

# CONTENTS

# VOLUME: II-G/2
# PART-B

# SECTION-XIX

# GUIDELINE
# FOR
# SAFETY REQUIREMENTS FOR CONSTRUCTION WORKS

## 1.00.00 GENERAL

This specification deals with the subject matter of safety and protection to be observed in the Civil Construction. This shall be followed along with all related statutory requirements/obligation including Governmental byelaws, codes, ordinance of local or central authorities related to the construction work.

In case of complicated work like deep excavation, intricate shuttering and formwork, excavation in loose soil and below water table, stacking of excavated earth etc., work plan with necessary drawings and documents have to be prepared by the Bidder and got approved by the Engineer.

Necessary reference shall be made to the following Indian Standard Codes on safety requirements for various type of work :

**Indian Standard**

| | |
|---|---|
| 5916 | Construction with Hot Bituminous Materials. |
| 4130 | Demolition of Buildings. |
| 3764 | Excavation Work |
| 5121 | Piling & Other Deep Foundations. |
| 4014 - (P-II) | Scaffolding, Steel Tubular. |
| 3696 – (P-I & P-II) | Scaffolds and Ladders. |
| 6922 | Structures Subject to Underground Blasts. |
| 4756 | Tunneling Work. |
| 5499 | Underground Air-raid Shelters in Natural Soil. |
| 4138 | Working in Compressed Air. |
| 7293 | Working with Construction Machinery |
| 8989 | Erection of Concrete Framed Structures. |

## 2.00.00 EXCAVATIONS

2.01.00 Sides of all excavations must be sloped to a safe angle, not steeper than the angle of repose of the particular soil. If it is not possible to give a proper slope, the sides of the excavation where there is a danger of fall or dislodgement of earth or any material, shall be securely supported by timber or other type of shoring.

2.02.00 No excavation or earth work below the foundation level of an adjoining building shall be taken up unless adequate steps are taken to prevent damage to the existing structure or fall of any part.

2.03.00 Every accessible part of an excavation, pit or opening in the ground into which there is a danger of persons falling shall be suitably fenced with a barrier upto a height of one metre suitably placed from the edge of the excavation as far as practicable.

2.04.00 No material or load shall be placed or stacked near the edge of the excavation or opening in the ground. The excavated material shall not be placed within 1.5 m of the trench or half of the depth of the trench whichever is more.

2.05.00 Cutting shall be done from top to bottom. No undercutting of sides of excavation shall be allowed.

2.06.00 All narrow trenches 1.2 m or more depth, shall at all times be supplied with atleast one ladder for each 30m in length or fraction thereof. Ladder shall be extended from bottom of the trench to atleast one metre above the surface of the ground. The side of the trenches which are 1.5 m or more in depth shall be stepped back to give suitable slope, or securely held by planking, strutting and bracing so as to avoid the danger of side collapse.

2.07.00 Materials shall not be dumped against existing walls or partition to a height that may endanger the stability of the walls.

2.08.00 While withdrawing piled materials like loose earth, crushed stone, sand, etc., from the stock piles, no over hanging shall be allowed to be formed in the existing dump.

2.09.00 No material on any of the sites of work shall be so stacked or placed as to cause danger or inconvenience to any person or public or any other agency at work.

## 3.00.00 DEMOLITION

3.01.00 On every demolition job, danger signs shall be conspicuously posted all round the structure and all doors, openings giving access to the structure shall be kept barricaded or marked except during the actual passage of workmen or equipment. However, provision shall be made for at least two independent exits for escape of workmen during any emergency.

3.02.00 During night, red lights shall be placed on or about all the barricades.

3.03.00 Where in any work of demolition it is imperative, because of danger existing to ensure that no unauthorised person shall enter the site of demolition out-side working hours, a watchman shall be employed. In addition to watching

the site he shall also be responsible for maintaining all notices, lights and barricades.

3.04.00 All the necessary safety appliances as per IS ;4130 shall be issued to the workers and their use explained. It shall be ensured that the workers are using all the safety appliances while at work.

3.05.00 The removal of a member may weaken the side wall of an adjoining structure and to prevent possible damage, these walls shall be supported until such time as permanent protection is provided. In case any danger is anticipated to the adjoining structure the same shall be got vacated to avoid any danger to human life.

3.06.00 The power on all electrical service lines shall be shut off and all such lines cut or disconnected at or outside the property line, before the demolition work is started. Prior to cutting of such lines the necessary approval shall be obtained from the electrical authorities concerned. The only exception shall be any power line required for demolition work itself.

3.07.00 All gas, water, steam and other service lines shall be shut off and capped or otherwise controlled at or outside the building line, before demolition work is started.

3.08.00 All the mains and meters of the building shall be removed or protected from damage.

3.09.00 If a structure to be demolished has been partially wrecked by fire, explosion or other catastrophe, the walls and damaged roofs shall be shored or braced suitably.

3.10.00 Walkways and passage ways shall be provided for the use of the workman who shall be instructed to use them and all such walkways and passageways shall be kept adequately lighted, free from debris and other materials.

3.11.00 All nails in any kind of lumber shall be withdrawn, hammered or bent over as soon as such lumber is removed from the structure being demolished, and placed in piles for future cleaning or burning.

3.12.00 All the roads and open area adjacent to the work site shall either be closed or suitably protected.

3.13.00 No electric cable or apparatus which is liable to be a source of danger or a cable or apparatus used by the operator shall remain electricity charged.

3.14.00 All practical steps shall be taken to prevent danger to persons employed from risk of fire or explosion or flooding. No floor, roof or other part of the building shall be so overloaded with debris or materials as to render it unsafe.

## 4.00.00 VEHICLE

4.01.00 No person shall board any vehicle or equipment when it is in motion.

4.02.00 Suitable blocks shall be placed against the wheels of a vehicle when it is used for tipping materials into excavation or a pit or over the edge of any embankment or earthwork to avoid the danger of its running over the edge.

4.03.00 All workers shall stand clear of the vehicle while it is dumping. If the material being dumped is very heavy or sticky, dump hooks shall be used or dumper shall be clamped to prevent any danger of its tripping.

4.04.00 Materials shall not be allowed to be loaded in a vehicle so as to project horizontally beyond the sides of the body of the vehicle. All materials projecting beyond the front or rear shall be indicated by a red flag in the day and with red light in the night.

4.05.00 Driver of the truck or any heavy vehicle shall not reverse it unless assisted by a signal man who shall have a clear view of the driver and the area beyond the truck during reversing operation.

4.06.00 Maximum speed of a heavy vehicle must not exceed 15 km. per hour.

## 5.00.00 SCAFFOLDING, GANGWAYS, LADDERS & SHUTTERING

5.01.00 For all work that cannot be done from the ground level or from part of any permanent structure or from other available means of support, soundly constructed scaffoldings of adequate strength shall be used as a safe means of access to places of work.

5.02.00 All scaffolding shall be securely supported or suspended and wherever necessary be properly braced to ensure stability.

5.03.00 Chains, ropes or other lifting materials used for the suspension of scaffoldings must be of adequate strength and shall be of tested quality.

5.04.00 All such chains and ropes used for the suspension of scaffoldings shall be properly fastened to safe anchorage points.

5.05.00 The platform of a suspended scaffolding shall be sufficiently wide. Suspended scaffolding shall have hand rail on 3 sides of about 1.0 m height.

5.06.00 All working platform and stages from which workers are liable to fall shall be of adequate width depending on the type of work done and closely boarded and planked.

5.07.00 Scaffolding or staging more than 3.5 m above the ground or floor, suspended from an overhead support or erected with stationary support shall have a guard rail properly attached, bolted, braced and otherwise secured atleast 1

m high above the floor or platform of such scaffolding or staging and extending along the entire length of the outside ends thereof with only such opening as may be necessary for the delivery of materials. Such scaffolding or staging shall be so fastened as to prevent it from swaying from the building or structure. The platform shall also be provided with toe boards of atleast 150 mm high so placed as to prevent the fall of materials and tools from there.

5.08.00 All platforms or gangways, runways and the stairs shall be kept free from unnecessary obstructions, materials or junk.

5.09.00 Working platforms, gangways & stairways shall be so constructed that they shall not sag unduly or unequally, and if the height of the platform or the gangway or the stairway is more than 3.5 m above ground level or floor level they shall be closely boarded, shall be of adequate width and shall be suitably fenced.

5.10.00 Every opening in the floor of a building or in a working platform shall be provided with suitable fencing or railing whose minimum height shall be 1 m to prevent the fall of persons or materials.

5.11.00 Every ladder shall be securely fixed at top and bottom. A ladder more than 5 m long shall have a prop.

5.12.00 All ladders used shall be of good construction, sound materials and adequate strength. Ladders with defective or missing rungs shall not be brought into use. The spacing of rungs shall not exceed 30 cm and these shall be recessed atleast 12 mm into rails.

5.13.00 All ladders or rungs used for vertical height of more than 10 m shall have an intermediate landing. All such intermediate landings shall be provided with guard rails to a height of atleast 1 m.

5.14.00 Every ladder shall be securely placed so that it cannot move either at the top or at the bottom and it shall rise to a height of atleast 1.2 m above the place of landing.

5.15.00 No portable single ladder shall be over 8 m in length.

5.16.00 Spacing between the side rails of the ladder shall not be less than 300 mm for ladders upto 3 m in length. For longer lengths, this shall be increased at 6 mm for each additional 0.3 m of length.

5.17.00 Metal ladders must not be used for electrical work or near electric circuit of equipment.

5.18.00 All scaffolds, ladders and other safety devices mentioned or described herein shall be maintained in safe condition and no scaffold, ladder or equipment shall be altered or removed while it is in use.

5.19.00 Unfinished scaffolding which is under construction shall be prominently marked as unsafe and any access points shall be closed.

5.20.00 All Planking and Decking on walkways and scaffolds shall be adequately supported at each end of the plank and intermediately if necessary. Planks shall not be allowed to cantilever beyond the last support but shall be overlapped if necessary on to the next plant.

5.21.00 Shuttering

The above remarks shall be applicable for this also. Shuttering, particularly for slabs, shall be treated as a scaffold. Unfinished shuttering shall be marked as dangerous similarly the finished formwork shall be adequately supported, care being taken to avoid trap door effects.

## 6.00.00 MOBILE LIFTING APPLIANCES

6.01.00 No mobile lifting appliances shall used on a sloping surface unless adequate precautions are taken to ensure stability.

6.02.00 Adequate precautions shall be taken to see that jib of the mobile crane does not come in contact with overhead electric transmission line.

6.03.00 Only one person shall give signals to the operator of mobile lifting appliances.

6.04.00 Maximum load to be lifted by lifting appliances shall be marked in a position where it can be clearly seen by the crane driver and the operator.

6.05.00 No load shall be raised, lowered or suspended from a chain or rope having a knot in any of the part.

6.06.00 No chain which is joined to another chain by means of bolt and nut shall be used for raising, lowering or suspending any load.

6.07.00 All chains, ropes and lifting gears shall be carefully examined and tested by a competent Maintenance Engineer at least once in every quarter.

6.08.00 When the work is stopped or when the mobile lifting equipment is not in operation, the boom must be lowered to the horizontal position and tied securely in place to prevent accidental drop.

6.09.00 No person shall walk under a load which is swinging by a lifting equipment.

Guide rope must be attached to the load to prevent its swinging.

6.10.00 The foot blocks of the crane before starting work shall be securely supported and firmly anchored to prevent its movement in any direction.

6.11.00 Use of Hoisting machines and tackle including their attachments, anchorage and supports shall conform to the following standards of condition.

6.11.01 These shall be of good mechanical construction, sound material and adequate strength and free from defect and shall be kept in good working order.

6.11.02 Every rope used in hoisting or lowering materials or as a means of suspension shall be of durable quality and adequate strength and free from patent defects.

6.11.03 Every crane driver or hoisting appliance operator shall be properly qualified and no person under the age of 21 years shall be in charge of any hoisting machine or give signals to the operator.

6.11.04 In case of every hoisting machine and every chain ring hook shackle swivel and pulley block used in hoisting or lowering or as means of suspension the safe working load shall be ascertained by adequate means, every hoisting machine and all gears referred to above shall be plainly marked with the safe working load. In case of hoisting machine having a variable safe working loading, each safe working load of the conditions under which it is applicable shall be clearly indicated. No part of any machine or of any gear referred to above in this paragraph shall be loaded beyond the safe working load except for the purpose of testing. Mobile cranes shall have the working load and the radius of jib for the load marked on it.

6.11.05 The top pulley for hoisting a load shall be opened monthly and the spindle inspected to see if any undue wear has taken place and for greasing.

6.11.06 In case of departmental machine, the safe working load shall be notified by the Engineer concerned. As regards bidder's machines the Bidder shall notify the safe working load of the machine to the Engineer whenever he brings any machinery to site of work and get it verified by the Engineer concerned.

6.12.00 Motors, gearing, transmission, electric wiring and other dangerous part of hoisting appliances shall be provided with efficient safeguards. Hoisting appliances shall be provided with such means as shall reduce to the minimum, the risk of accidental descent of the load. Adequate precautions shall be taken to reduce to the minimum, risk of any part of a suspended load becoming accidentally displaced.

## 7.00.00 RIVETTING, WELDING & GAS CUTTING & STEEL ERECTION

### 7.01.00 Rivetting

7.01.01 Bolts covered with wet or slippery compounds shall not be used in fabricating structural work.

7.01.02 The rivet heater must keep the rivet heating equipment as near as possible to the place of work.

7.01.03 A pail of water shall always be kept ready for quenching fire when stopping rivetting work.

7.01.04 Hot rivet shall not be thrown across aisles and shaftways.

7.01.05 Metal buckets for catching hot rivets must have false wooden bottoms to prevent rivets from rebounding.

7.01.06 All rivets, bolts, nuts, and other tools must be kept in boxes and not let loose, (For any further safety measures relevant Indian Standards and safety specifications of structural section shall be referred to).

7.02.00 Welding & Gas Cutting

7.02.01 All cylinders must be used and stored in upright position only.

7.02.02 Cylinders must be stored away from open flames and other source of heat.

7.02.03 Oxygen cylinders must not be stored near other cylinders containing gas or oil, grease or other combustible materials.

7.02.04 While the cylinder is in use, the cylinder valve key or wrench must be placed on the valve spindle.

7.02.05 Before a cylinder is moved, the cylinder valve must be closed.

7.02.06 Gas cutting torches must be lighted by means of friction flames or similar other methods and not with matches.

7.02.07 When torches are being changed or welding stopped for some time valves for all cylinders must be closed.

7.02.08 Thecoloured lenses used for welding or gas cutting must be of proper shade for the work being done.

7.02.09 Suitable eye protection equipment such as goggles, hand shields etc., must be used by persons engaged in welding or gas cutting operations.

7.02.10 Before any heavy structural member is gas cut, make sure that it is cleared and supported by ropes, cables, chains or any other means to prevent its dropping or swinging.

7.02.11 Cylinder valves and connections are not to be lubricated. All oily or greasy substances must be kept away from cylinders.

7.02.12 Substantial and incombustible screen must be used below or near the welding operations, if there is a possibility of a spark falling on other workmen engaged in work closely.

7.02.13 All air pipe lines and air hoses must be frequently inspected. Air hoses shall not be used for dusting or for cooling purposes.

7.03.00 Steel Erection

7.03.01 All persons shall stand clear when a crane is sorting or shifting steel girders or other structural materials.

7.03.02 No person shall stand, walk or work beneath any suspended load.

7.03.03 Guide rope must be used for guiding lifting loads.

7.03.04 When guiding a beam or fabricated structure or erection it shall be so held that the employees hands do not get jammed against other objects.

7.03.05 Safety belts equipped with suitable life lines must be used by persons working at heights and standing on structural members. Life line must be tied to an independent support. For any further safety measures, for Structural Steel Works, IS : 7205 shall be referred to.

## 8.00.00 SAFETY APPLIANCES

8.01.00 Workers employed on mixing asphaltic materials, cement and lime mortars, shall be provided with protective footwear and protective goggles.

8.02.00 Those engaged in white washing and mixing or stacking of cement bags or any materials which is injurious to the eyes, shall be provided with protective goggles.

8.03.00 Those engaged in welding works shall be provided with welder's protective eye-shields.

8.04.00 Stone breakers shall be provided with protective goggles and protective clothing and seated at sufficiently safe intervals.

8.05.00 When workers are employed in sewers and manholes which are in use, the Bidder shall ensure that the manhole covers are opened and chambers are ventilated atleast for an hour before the workers are allowed to get into the manholes, and the manholes so opened shall be cordoned off with suitable railing and provided with warning signals or boards to prevent accident to the public.

8.06.00 The Bidder shall not employ men below the age of 18 and women on the work of painting with products containing lead in any form. Whenever men above the age of 18 are employed on the work of lead painting the following precautions shall be taken :

8.06.01 No paint containing lead or lead products shall be used except in the form of paste or ready made paint.

8.06.02 Suitable face mask shall be supplied for use by them when paint is applied in the form of spray on a surface having lead paint dry rubbed and scraped.

8.06.03 Overalls shall be supplied by the Bidders to the workmen and adequate facilities shall be provided to enable the working painters to wash during the cessation of work.

8.07.00 The workers going into inspection chamber shall have gas masks, gum boots and rubber gloves while working inside. After coming out they shall have some disinfectant from the first aid box for proper washing

8.08.00 All necessary personnel safety equipment such as safety helmets, safety boots, safety belts, leather gloves for welders, clear glass safety goggles etc., as considered adequate by the engineer have to be kept available for the use of persons employed at the site of work and maintained in condition suitable for immediate use and Bidder shall take steps to ensure proper use of equipment by the workers.

8.09.00 All the persons entering the tunnel shall be provided with protective wear, such as helmets, steel toe safety shoe, gum boots or other suitable type of protective foot wear. In the case of steeply inclined tunnels and inshafts, safety belts shall also be provided.

8.10.00 Sign boards 1 x 1.5 m in size with the following wording shall be erected at the access to these areas. "CONSTRUCTION AREA, HELMET REQUIRED BEYOND THIS POINT"

8.11.00 No loose garments or ragged clothing shall be worn by the personnel engaged in tunneling operation.

8.12.00 A telephone system shall provided to ensure a positive and quick method of communication between all control location inside tunnel and portal of the tunnels when longer than 500 m and for shafts when longer than 50 m

8.13.00 Irrespective of length and bends in the tunnel, arrangements shall be made for transmitting of warning signals by any one of the following means.

8.13.01 By electrically operated bells, operated by battery/dry cells with the bell placed outside the tunnel and the position of the switch shifting with the progress of the tunneling work. The position of the operating switch although temporary shall be so chosen as to ensure proper accessibility and easy identification.

8.13.02 By the use of two field (magnet type) telephone.

8.13.03 Any other suitable arrangement like walkie-talkie.

8.14.00 Arrangement for rendering prompt and adequate first aid to the injured persons shall be maintained at every work site under the guidance of a medical officer-in-charge of the project. Depending upon the magnitude of the work the availability of an ambulance at a very short notice (at telephone call) shall be ensured.

8.15.00 First-aid arrangements commensurate with the degree of hazard and with the number of workers employed shall be maintained in a readily accessible place throughout the working hours. At least one experienced first-aid attendant with his distinguishing badge shall be available on each shift to take care of injured persons. Arrangements shall be made for calling the medical officer, when such a need may arise. It is recommended that foreman/assistant foreman/supervisor/ permanent workmen who are normally present at each working phase in each shift are given adequate training on first-aid methods to avoid employment of a separate attendant.

8.16.00 Stretchers and other equipment necessary to remove injured persons shall be provided at every shift.

8.17.00 Where there are more than 50 persons working in a shift, effective artificial respiration arrangements shall be provided, with trained men capable of providing artificial respiration.

**9.00.00 ELECTRICAL**

9.01.00 Onlyauthorised persons shall handle or otherwise interfere with electrical equipment. Any person detecting electrical apparatus being handled by an unauthorised person or equipment in unsafe condition must report the matter to the Engineer concerned.

9.02.00 No person shall work on any live electric conductor or apparatus and no person shall assist such person on such work, unless he is authorised in that behalf.

9.03.01 After isolating the equipment from the source of supply before the work begins, a sign 'DONT'T SWITCH ON' must be hung on or near the switch to avoid its being accidentally or inadvertently switched on when persons are working.

9.03.02 Take out the fuses and keep in safe custody.

9.03.03 The switch may be locked if locking arrangement exists.

9.03.04 Earth the equipment, before work, to discharge it and short the terminals as a precautionary measure against accidental switching ON.

9.03.05 After the work is finished take out Earthing and shorting link.

9.03.06 Remove all tools and materials from the site of work. Replace the fuses and unlock the switch.

9.03.07 The switch shall only be put 'ON' by the person who switched it 'OFF' or by the person authorised by him in writing.

9.04.00 When working on live equipment use one hand only whenever possible, it is advisable to keep the other hand behind the back. Shocks from hand to hand are most dangerous.

9.05.00 All persons handling electrical gear in elevated position must use safety belts. Even a slight shock may cause loss of balance and fall.

9.06.00 No one shall attempt to extinguish a fire on or near a live electrical apparatus with water. Water is a good conductor of electricity. Use extinguishers wherever provided. Use sand and blankets etc., if available.

9.07.00 No person shall use any part of electrical equipment for storing or hanging clothes, umbrellas or other articles. Serious accidents occur from this practice.

9.08.00 For attending the work on O.H. lines or equipment use wooden ladders. Metallic ladders shall not be used.

9.09.00 Use insulated tools and ensure the insulation is in proper condition periodically at least once in three months. Use rubber gloves wherever possible.

9.10.00 As far as possible verbal instructions shall be avoided in case of pre-arranged shut-down of electrical apparatus.

9.11.00 When workers are employed for electrical installations which are already energised, insulating mats, wearing apparel such as gloves, sleeves and boots as may be necessary shall be provided. The workers shall not wear any rings, watches and carry keys or other materials which are good conductors of electricity.

## 10.00.00 MISCELLANEOUS

10.01.00 The Bidder shall provide necessary fencing and lights to protect the public from accident.

10.02.00 Fire extinguishers adequate in number shall be kept by the Bidder at the site of works where there is risk of fire hazard.

10.03.00 Adequate washing facilities shall be provided near the place of work.

10.04.00 When the work is done near any place where there is risk of drowning, all necessary equipment shall be provided and kept ready for use and all necessary steps taken for prompt rescue of any person in danger and adequate provisions shall be made for prompt first aid treatment of all injuries likely to be sustained during the course of the work.

10.05.00 These safety provisions shall be brought to the notice of all concerned by displaying on a Notice Board at a prominent place at the work spot. The

persons responsible for compliance of the code shall be named therein by theBidder.

10.06.00 To ensure effective enforcement of the rules and regulations relating to safety precautions, the arrangements made by the Bidder shall be open to inspection by the Engineer and Owner.

10.07.00 Not withstanding the above clauses there is nothing in those to exempt the Bidder from the operations of any other Act or Rule in force in the Republic of India.

10.08.00 All storage, handling and use of flammable liquids shall be under the supervision of qualified persons. Flammable liquid shall not be stored inside the tunnel

10.09.00 All sources of ignition shall be prohibited in areas where flammable liquids are stored, handled and processed. Suitable warning and 'NO SMOKING' signs shall be posted in all such places. Receptacles containing flammable liquids shall be stacked in such a manner as to permit free passage of air between them.

10.10.00 All combustible materials shall be continuously removed from such areas where flammable liquids are stored, handled and processed. All spills of flammable liquids shall be cleared up immediately. Containers of flammable liquids shall be tightly capped.

## 11.00.00 REPORTING OF ACCIDENT

All accidents, major or minor must be reported immediately. The Bidder, shall provide first aid to the injured person immediately and the injured person shall report to the first aid station along with the 'INJURED ON WORK' form duly filled in quintuplicate and submit to the Medical Officer of the First Aid Station".

### Serious Injury

In case of serious injury, the following procedure shall be adopted by the Bidder :

1). Provide First Aid at his own First Aid Station.

2). Take the injured person to the Hospital along with the "INJURED ON WORK" form duly filled in.

3). Reporting the accident to the Owner/Engineer by the Bidder.

### Fatal Accident

Fatal accident must be reported immediately to the Engineer/Owner as well as to the Police.

**Penalty**

Failure to observe the Safety Rules shall make the Bidder liable to penalty by way of suspension of work, fine and termination of bid.

## 12.00.00 GENERAL SAFETY PROVISIONS FOR COOLING TOWER AND CHIMNEY:

There are numerous safety aspects to consider in construction; they are affected not only by the structural and environmental aspects of the form and scaffold system in use, but also by the strength and stability of the partially completed structure.

The early age of the concrete is a critical item and can control the rate of progress. Similarly, the design, manufacture, and installation of anchorages in the young concrete are important items. Jump form systems rely heavily on strengths of previous lifts to resist construction loads and moments; vertical slip forms do not typically apply eccentric loads to lifts below but are dependent on the strength of concrete at very early ages.

Training of personnel is important to the safe operation of any construction system. It is a critical item in the use of jump form and slip form systems. The sequencing and execution of the many procedures involved can affect the overall safety of the system, including the partially completed structure. The bidder shall implement safety inspection procedures which shall be part of the field records. Personnel shall be made aware of the interrelationships of the various system components and be cautioned as to the critical elements.

Access ways shall be available for use at all times, without restrictions caused by debris or other items. Alternate routes must be made available in the event normal access is interrupted. Ladders between work levels shall be secured and available at all times; access hatches shall be clearly marked and available at any time.

**CONSTRUCTION REVIEWS**

Preconstruction reviews can be useful in acquainting jobsite personnel and other associated personnel with planned construction methods, form and scaffold systems, materials delivery systems, schedules, and overall operating procedures. Compliance officers can be informed of safety procedures to be in effect and notified of persons responsible for reporting. Preliminary discussions shall include basic construction procedures and schedules, as well as design loading criteria for the form and scaffold system. More specific procedures, schedules, and loads can be provided with design drawing submittals at a later time, but prior to starting construction.

Critical conditions or loads shall be clearly noted; key operations shall be denoted and appropriate safety measures put into effect.

Regular or periodic construction meetings can be effectively used to review progress of construction and to discuss changes to operating procedures, equipment, and/or personnel.

Specific bench marks shall be established for all key operations; these shall include, but not necessarily be confined to, minimum concrete strength for form removal, minimum concrete maturity, minimum size and number of anchor bolts, and their proper placement, sequence of operation, maximum deck loads, minimum size and number of scaffold connections, maximum concrete casting rates and size and spacing of form ties.

Inspections shall be adequate to assure the bench marks are being met. Job site records can be satisfactorily used to review many items. Some items will require detailed inspections to be performed.

There are a number of key factors influencing the overall structural integrity of moving formworks used in the construction of cooling towers and chimneys. The principal forming systems, which have been addressed in the respective sections, cannot be treated independently of the partially completed structure. The forms, scaffolds, moving mechanisms and the structure combine to form an interactive construction system in which the safety of individual components is affected by the design and operation of other components.

A working knowledge of the operational aspects of the systems will ensure meaningful field evaluation of system safety by compliance officers. Among critical safety items, the capacity of partially matured concrete to resist imposed construction loads with an adequate margin of safety shall receive foremost priority.

The minimum factor of safety shall be maintained at a level consistent with the design of concrete structures for occupancy loads for two important reasons.

First, service loads and fully developed concrete strength are more predictable than construction loads and the strength of concrete at early ages. Second, the consequences of a construction failure in terms of human casualties would be quite severe owing to the fact that moving form systems are generally well-populated and inherently limited in providing the exit ways for emergency evacuation of personnel in the event of structural distress.

In addition, where the partially cured concrete supports loads transmitted by scaffolds and other work platforms, its strength requirements shall be consistent with the safety factors prescribed by the construction safety regulations.

The compliance officer shall expect to find field records which will show, above all else, that the construction system is well-conceived and structurally sound with regard to the maintenance of a minimum factor of safety on component strengths. The engineer's records shall be sufficiently comprehensive to indicate, through a detailed set of specifications, critical

benchmarks for the movement of forms and imposition of loads on partially cured concrete.

The field logs shall show these bench marks are being met. The proper implementation of these items is the key requirement contained in regulations. Many of the safety hazards found in cooling tower and chimney construction are universal in application.

Access ways must be available at all times, without blockage by debris or other items. All structural connections of the scaffolding and forming systems must be sound and adequate for the intended loads. Any signs of distress in the system, such as cracking, peeling, bending, etc., shall be noted and remedial measures taken immediately. Structural engineering consultants may be needed in the evaluation of certain moving form systems which incorporate relatively complex mechanisms (such as catheads used in conjunction with flexible cables to transport concrete to the top of the tower) capable of producing extraordinary loads on the partially matured concrete structure.

## 13.00.00 CHECK LIST FOR INSPECTION OF JUMP FORM SYSTEM

REFERENCE DOCUMENTS

REVIEWED

Tower drawings
Formwork drawings
Formwork calculations
Sequence of moving cycle
Criteria for form movement
Concrete records
Material test records
Maintenance records

| GENERAL | YES | NO |
|---|---|---|
| Overall formwork condition adequate | ---------- | ---------- |
| Routine maintenance performed | ---------- | ---------- |
| Regular inspections performed: | | |
| Concrete ---------- ---------- | | |
| Anchorages | ---------- | ---------- |
| Access ways | ---------- | ---------- |
| Forms | ---------- | ---------- |
| Training provided for personnel | ---------- | |
| Form movement criteria observed | ---------- | ---------- |
| Signs of overload or structural distress | ---------- | ---------- |
| If answer is yes, explain further. | | |

| CONCRETE | DESIGN | OBSERVED |
|---|---|---|
| 28-day compressive strength | ---------- | ---------- |
| Max. slump, in. | ---------- | ---------- |
| Max. water/cement ratio | ---------- | ---------- |
| Min. compr.str. for form movement | ---------- | ---------- |
| Min. comp. str. for placing concrete in succeeding lift | ---------- | ---------- |

General Comments:

| ANCHORAGES | DESIGN | OBSERVED |
|---|---|---|
| Design working load (in concrete, with safety factor) | ---------- | ---------- |
| - | | |
| Shear | ---------- | ---------- |
| Tension | ---------- | ---------- |
| Nominal size of embedment | ---------- | ---------- |
| Nominal size of anchor bolt | ---------- | ---------- |
| Min. anch.bolts per strongback | ---------- | ---------- |

General Comments:

| ACCESS/EGRESS | DESIGN | OBSERVED |
|---|---|---|
| Level 1 (Top) scaffold (…….. simple…….. braced……. Cantilevered) | | |
| Live load | ---------- | ---------- |
| Spacing of scaffold brackets | ---------- | ---------- |
| Nom.bolt sizes | ---------- | ---------- |
| Level 2 Scaffold (……. Simple…….. braced……. cantilevered) | | |
| Live load | ---------- | ---------- |
| Spacing of scaffold brackets | ---------- | ---------- |
| Nom. bolt sizes | ---------- | ---------- |
| Level 3 Scaffold (…….. simple…….. braced……. cantilevered) | | |
| Live load | ---------- | ---------- |
| Spacing of scaffold brackets | ---------- | ---------- |
| Nom. bolt sizes | ---------- | ---------- |
| Level 4 Scaffold {…… simple…… ….braced…….. cantilevered) | | |

Live load ---------- ----------
Spacing of scaffold brackets ---------- ----------
Nom. bolt sizes ---------- ----------
Miscellaneous Comments:
Ladders: _____
Stairs: _____
Elevators: _____
Guardrails: _____
Toe boards: _____
Maintenance: _____
General Comments: _____

| HOISTING SYSTEM | DESIGN | OBSERVED |
|---|---|---|
| Main hoist line | | |
| Min. sheave size | ---------- | ---------- |
| Min. line size | ---------- | ---------- |
| Static line | | |
| Min. sheave size | ---------- | ---------- |
| Min. line size | ---------- | ---------- |
| Max. tension | ---------- | ---------- |
| Max. hoist load | ---------- | ---------- |

General Comments:

---

| RAISERS | YES | NO |
|---|---|---|
| Mechanical components checked regularly | ---------- | ---------- |
| Safety mechanism operating properly | ---------- | ---------- |
| Regular maintenance performed | ---------- | ---------- |

General Comments:

---

**CHECK LIST FOR INSPECTION OF SLIP FORM SYSTEM**

| REFERENCE DOCUMENTS | REVIEWED |
|---|---|
| Chimney / silo drawings | ---------- |
| Formwork drawings | ---------- |
| Formwork calculations | ---------- |
| Criteria for slipping rate | ---------- |
| Concrete records | ---------- |
| Material test records | ---------- |
| Maintenance records | ---------- |

| GENERAL | YES | NO |
|---|---|---|
| Overall formwork condition adequate | ---------- | ---------- |
| Routine maintenance performed | ---------- | ---------- |
| Regular inspections performed | ---------- | ---------- |
| Concrete | ---------- | ---------- |
| Climbing rods | ---------- | ---------- |
| Anchorages | ---------- | ---------- |
| Access ways | ---------- | ---------- |
| Forms | ---------- | ---------- |
| Training provided for personnel | ---------- | |
| Form slipping criteria observed | ---------- | ---------- |
| Signs of overload or structural distress | ---------- | ---------- |

If answer is yes, explain further_____

| CONCRETE | DESIGN | OBSERVED |
|---|---|---|
| 28-day compressive strength---------- | ---------- | |
| Max. slump in. | ---------- | ---------- |
| Max. water/cement ratio | ---------- | ---------- |

| CLIMBING RODS | DESIGN | OBSERVED |
|---|---|---|
| Diameter of rods | ---------- | ---------- |
| Unbraced length | ---------- | ---------- |
| Dist between climbing rods | ---------- | ---------- |

General Comments: _____

| ANCHORAGE (climbing mast system) | DESIGN | OBSERVED |
|---|---|---|
| Design working load (in concrete, with safety factor) -------- | | ---------- |
| Shear | ---------- | ---------- |
| Tension | ---------- | ---------- |
| Nominal size of embedment | ---------- | ---------- |
| Nominal size of anchor bolt | ---------- | ---------- |

General Comments:

_____

| ACCESS/EGRESS | DESIGN | OBSERVED |
|---|---|---|
| Main work deck Live load, psf | ---------- | ---------- |
| Level I (TOP) scaffold (…….. ..simple……braced……cantilevered) | | |
| Live load | ---------- | ---------- |
| Spacing of scaffold brackets | ---------- | ---------- |
| Nom. bolt sizes | ---------- | ---------- |
| Level 2 scaffold (… simple…… Braced……cantilevered) | | |
| Live load | ---------- | ---------- |
| Spacing of scaffolds brackets | ---------- | ---------- |

Nom. bolt sizes ---------- ----------

Level 3 scaffold […….. simple……Braced……cantilevered)
Live load ---------- ----------
Spacing of scaffold brackets ---------- ----------
Nom. bolt sizes ---------- ----------
Miscellaneous Comments:
Ladders: ---------- ----------
Stairs: ---------- ----------
Elevators: ----------
Guardrails: ---------- ----------
Toe boards: ----------
Maintenance: ---------- ----------
General Comments:

---

YOKES/HYDRAULIC JACKS YES NO

Level controls ---------- ----------
adequate Safety mechanisms ---------- ----------
operating properly ---------- ----------
Regular maintenance performed ---------- ----------
General Comments:_____

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## Annexure-3: HSEP Plan for Site Operations

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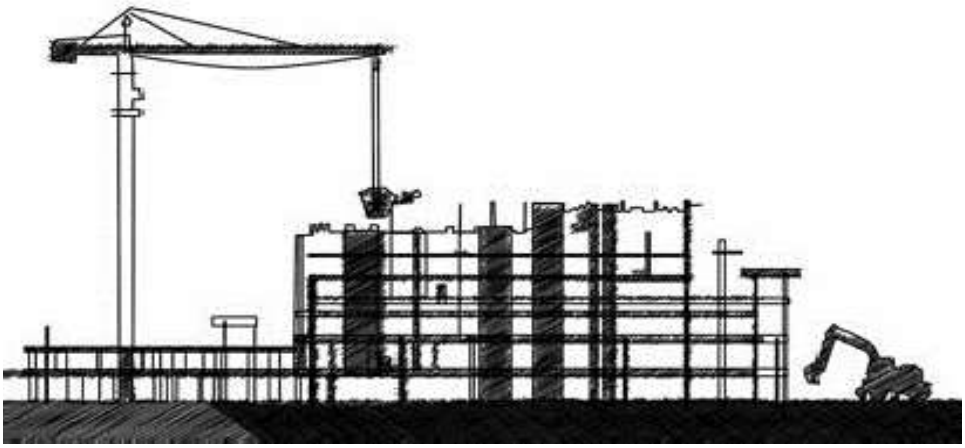
# HSEP14

# Health, Safety & Environment Plan for Site Operations by Subcontractors



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# SECTION A

# CRITICAL RESOURCES FOR HSE IMPLEMENTATION

# 1. SHARING OF OPERATING COSTS OF FACILITIES

**TABLE A.1**

| SN | FACILITY |
|---|---|
| 1 | Ambulance with 24 hr. First Aid Trained Driver (Specs in Annexure A) |
| 2 | Operation of Medical center, Nurses, Medical Consumables etc. (Specs in Annexure A) |
| 3 | Training Center Consumables |
| 4 | Water sprinkling for dust suppression |
| | (Others:) |

**Note:**

i. Responsibility of operation of above facilities shall rest with BHEL
ii. Operating cost of the above shall be deducted from subcontractors on 'proportional to contract' value basis. Sample deduction table enclosed as Annexure A.1
iii. "Contract value" defined above & subsequently in the document shall be considered as "Awarded contract value".
iv. No overhead cost/ enabling cost of BHEL shall be levied on the contractors for common facilities.
v. These running costs shall be recovered from all the available subcontractors at site for the complete operational duration of the site
vi. No overheads shall be charged on shared operating costs

# 2. RESOURCES TO BE PROVIDED SOLELY BY THE SUBCONTRACTOR

**TABLE A.2**

| SN | ITEM | SPECIFICATIONS |
|---|---|---|
| 1. | HSE DISPLAYS, Posters and signage | Annexure B |
| 2. | HSE Tools/ Equipment/ Devices | Annexure C |
| 3. | Rest Sheds for Workers | Annexure D |
| 4. | Labor Colony | Annexure E |
| 5. | Toilets (Latrines & Urinals) - in Site and Labor Colony | Annexure F |
| 6. | Fire Extinguishers | Annexure G |

**Note:**

In case subcontractor fails to provide the required resources, same will be procured and deployed by BHEL with applicable overhead on total procurement cost

# 3. ESTABLISHMENT OF COMMON FACILITIES

In green field projects BHEL shall arrange and provide the following facilities which shall be used by all subcontractors for their employees and workers. These shall be

i. Medical Centre
ii. Safety park with facilities of audio-visual training & vertigo test center.
iii. No cost shall be deducted from the subcontractors for the structure part only.
iv. The running cost with basic inputs already mentioned at Point 1 above shall be shared by all contractors.
v. The sub-contractors shall be required to ensure participation in trainings, medical checkup and vertigo test as per the guidelines laid in this document and required as per statutory HSE requirements.

vi. However, in projects where in these facilities are not provided by BHEL, subcontractors shall ensure the training, medical/ vertigo test of all workers at site in consultation and guidance of BHEL HSE team at site in line with provisions of this document.

vii. The overall onus of compliance to HSE practices pertaining to training, medical checkup including vertigo test shall lie on the subcontractor only.

# 4. CRITICAL REQUIREMENTS W.R.T. EQUIPMENT & PPES

i. Conventional Hydra crane with carriage in front shall not be permitted. Pick & carry tyre mounted Front Cabin mobile crane (FX or TRX/ NextGen series of 'ESCORT" or equivalent make) shall only be permitted.

ii. Any Heavy equipment (cranes, winch machines, etc.) shall be deployed only after pre-safety Inspection by safety dept. Valid AMCs/ Fitness/ other statutory clearances as per local rules shall be required to be submitted before mobilizing the equipment at site.

iii. All other Hand tools and power tools should not be older than 5 years.

iv. For Chimney passenger lift, winch to have double drum rope for passenger and double safety devices must be used. Winch should not more than 3 years old and winch rope must be inspected with valid certificate from competent authority within 6 months and should meet the IS standard 9507 provision of OLR and push back button arrangement or dead man switch.

v. Gate pass for all the lifting T&Ps and construction machinery/ equipment shall be made after obtaining written acceptance (Pre-entry Safety Clearance) from BHEL Site Safety Department after physical verification and checking all requisite documents/ compliance to Safety norms

vi. All motor vehicles should have valid registration certificate, insurance, Pollution under control (PUC) and fitness certificate as per Motor Vehicle Act 2020. The certificates should be pasted in the glass from inside.

vii. PPEs shall be from reputed manufactures viz. 3M, Udyogi, Karam, Frontier, Freedom, Honeywell, Liberty, Bata, Nomex, Acme, Unicare, Life Gear or equivalent. In case Subcontractor recommends any other name the same can be approved at site level by the Construction manager & Site HSE

viii. For height work, where fall could result in death or disability, a secondary means of fall protection (Safety Net, Retractable Fall Arrestor etc.) shall be mandatorily provided by the subcontractor, failing which, a penalty of INR 10000 per case will be imposed. In addition, there should be constant supervision for such critical height work. Any non-erection activities at height eg. Housekeeping etc. shall also fall under the category of height work

ix. **Scaffold Tagging**

Scaffolds being erected, modified or dismantled must be tagged as suitable for use. Tagging shall be done with standard tag holder. Scaffolding tag should be certified by scaffolding inspector having valid certificate.

- **GREEN** scaffold tag- shall be fixed when scaffold is complete and safe for use, signed and dated by the scaffolding competent person daily.
- **RED** scaffold tag – to be fixed if scaffold is in some way defective and cannot be used or is still under erection.
- **YELLOW** scaffold tag – to be fixed if scaffold is in under construction/ maintenance.


**FIG. A.4.1 SAMPLE SCAFFOLD TAGS AND TAG HOLDER**

x. **T&P Color Coding:**

a. Inspections and tests shall be documented by means of color coding which shall verify that inspections or testing are current and that all receptacles, portable Power tools, Lifting Tools & Tackles have been inspected and tested as required. The color codes used on the project shall be:

| GREEN | BLUE | YELLOW | PURPLE |
|---|---|---|---|
| January | April | July | October |
| February | May | August | November |
| March | June | September | December |

**TABLE. A.4.2: T&P COLOR CODES**

b. The cycle of colors shall be Quarterly as a minimum or as decided by BHEL. The color code tape / Sticker shall be clearly visible to designate the period for which the inspections and tests were conducted.

c. Following the initial inspection, the equipment must be color-coded quarterly as per color-coding instructions that will be issued by the subcontractor.

d. Fire extinguisher with the current month color-coding inspection sticker must be provided and secured in the platform.

e. All slings shall be regularly inspected in accordance with the requirement of the project for frequent and periodic inspections and discard immediately if they fail to meet the minimum requirements of the project.

f. The Subcontractor's HSE Officer shall ensure that all PPE is inspected prior to its issue. He is to ensure all subcontractor personnel are using safe and proper PPE equipment. Regular

inspections on the PPE shall be carried out and personnel not adhering to those inspections shall be removed immediately from the site.

g. A Ten (10) day interval period shall be given into each monthly color code change. During this Ten (10) day period either color shall be acceptable.

xi. **T&P Tagging:**

All deployed Wire Rope Slings, Chain Pulley Blocks, Hooks, slings etc. shall be Tagged using aluminum or any other metal tag with punching.

# 5. HSE PERSONNEL TO BE PROVIDED SOLELY BY THE SUBCONTRACTOR

## 5.1. NUMBERS OF HSE PERSONNEL (APPLICABLE FOR EACH WORK SHIFT)

Number of HSE Officers and Supervisors shall be in proportion to number of workers as per Table A.6 below

**TABLE A.5**

| No. of Workers | No. of HSE Supervisors | No. of HSE Officers |
|---|---|---|
| Up to 100 | 1 | 1 |
| 101 to 250 | 2 | 1 |
| 251 to 500 | 4 | 1 |
| 501 to 1000 | 6 | 2 |
| 1000 to 2000 | 6+ One additional supervisor up to every additional 250 workers | 3 |
| 2000-3000 | 10+ One additional supervisor up to every additional 250 workers | 4 |
| 3000-4000 | 14+ One additional supervisor up to every additional 250 workers | 5 |

### 5.1.1. DEPLOYMENT PLAN

i. Above requirement is for every shift for each unit.

ii. The dynamic deployment plan of Safety manpower at various locations containing names, areas, time periods, shifts etc. shall be submitted to BHEL for approval by subcontractor

iii. BHEL may modify the deployment plan based on nature and volume of jobs, Risks and hazards associated etc.

iv. For less than 20 workers HSE Officer is not mandatory. In case the number of workers exceed 20 for 3 consecutive months, HSE Officer is to be engaged. The HSE Officer shall be deployed for a minimum period of 6 months even if the number of workers fall below 20 in any month subsequent to deployment. If within that 6-month period, the number of workers is more than 20 for at least 3 months, the deployment duration of HSE Officer will extend further 6 months after completion of previous 6-month period.

v. For Site Material Management/ Handling (Loading/ Unloading) contracts, 1 no. HSE Officer shall be required irrespective of the total manpower deployed.

vi. HSE Officers/Supervisors of all the vendors may be required to report directly to BHEL HSE Officer at site & shall comprise as a total team for handling all HSE issues. However, each safety officer/ agency shall be individually responsible for the safe execution of work in their respective areas.

## 5.2. Qualification & Experience Requirements Of HSE Personnel

### 5.2.1. HSE Officer

First HSE Officer to be mandatorily as per Option I as under and shall be designated Senior HSE Officer. In case of non-availability of HSE Officers with Option I configuration, the subsequent HSE Officers can be as per Option II below with recorded reasons and approval of Site Construction Manager of BHEL. All these deviations should be reported to Region HSE and PSHQ HSE.

**A. Option I**

i. possesses a recognized degree in any branch of engineering or technology or architecture and had a practical experience of working in a building or other construction work in a supervisory capacity for a period of not less than two years or possesses a recognized diploma in any branch of engineering or technology and has had practical experience of building or other construction work in a supervisory capacity for a period of not less than five years;

ii. possesses a recognized degree or diploma in industrial safety with at least one paper in construction safety (as an elective subject/ part thereof);

iii. has adequate knowledge of the language spoken by majority of building workers from the construction site in which he is to be appointed.

**B. Option II:**

Graduation Degree in Science with Physics & Chemistry and degree or diploma in Industrial Safety (All Degrees/ Diploma from any Indian institutes recognized by AICTE or State Council of Technical Education of any Indian State) with practical experience of working in a building, plant or other construction works (as HSE Officer, in line with Indian Factories Act, 1958 or BOCW Act, 1996) for a period of not less than five years

**Note:**

i. HSE Officer as per Option II shall be valid only on availability of Senior HSE Officer as per Option I at site.

ii. In case of resignation of the Senior HSE Officer, the same has to be replaced within 15 days else all subsequent HSE Officers as per Option II (in case of multiple HSE Officers with a single agency) shall not be considered as valid.

iii. The penalty shall be deducted considering non-availability of any HSE Officer at site.

### 5.2.2. HSE Supervisor: Either of X or Y below

X. Recognized Degree in any branch of Engineering OR Diploma in any branch of engineering with at least one-year construction experience

OR

Y. A recognized graduation Degree in Science (with Physics & Chemistry) or a recognized diploma in Engg. or Tech.

Additional requirements for option (Y) above

i. Trained in fire-fighting as well as in safety / occupational health related subjects, with:
ii. Minimum Two years of practical experience in construction work environment or in the field of safety and

**Note:**

i. Option a above is by default, b is under special approval from Site HSE & Construction manager
ii. In both cases the candidate should possess requisite skills to deal with construction & fire safety related day-to-day issues.

## 5.3. HSE In-Charge

In case there is more than one HSE Officer with any subcontractor, one of them, who is senior most by experience & meets qualification as per option 1 as mentioned in clause 2.1 A above (in HSE discipline), may be designated as HSE In-charge who will be the nodal point of contact on HSE matters.

## 5.4. Supporting Staff To HSE Team

i. Supporting Staff shall include scaffolders, scaffolding inspectors, riggers, skilled and unskilled manpower
ii. Subcontractor shall provide adequate number of workers as and when required, in order to attend and comply to Safety observations raised by BHEL/ Customer.

## 5.5. Availability And Penalty For Non-Deployment

i. The subcontractor shall submit the certificates of qualification & experience of HSE manpower before deployment for BHEL to assess suitability as per requirement detailed in this document
ii. In case of rejection, subcontractor shall arrange additional candidates and submit resume to BHEL. Penalties will be applicable during the period of non-deployment in such cases as well.
iii. Subcontractor shall ensure physical availability of safety personnel at the place of specific work locations.
iv. The Subcontractor shall deploy the HSE Officers as per the site's requirement. Non-deployment shall lead to stoppage of the work and final decision shall rest with Site HSE & Construction manager.
v. The Subcontractor shall prepare an organization chart identifying the areas of operations, responsibilities and reporting structure of all safety personnel for each shift and submit the same to BHEL.
vi. The subcontractor shall deploy sufficient HSE Officers, supervisors, as per numbers & qualifications mandated in this Section since mobilization of first batch of manpower and add more in proportion to the added strength in work force. Any delay in deployment will attract a penalty at following rates:

| | |
|---|---|
| Non-deployment of HSE Officer – | Rs. 75,000 per man-month |
| Non-deployment of HSE Supervisor – | Rs. 50,000 per man-month |

vii. Penalty shall be collected for the period of non-availability of safety personnel after allowing a grace period of 15 days for finding a replacement. The same shall be deducted on pro-rata basis till the required manpower is deployed.

viii. In case of abnormal delay & frequent rejections of candidates proposed by the subcontractor, BHEL shall exercise the right to deploy the safety manpower & deduct the amount from subcontractor's running bill with applicable overheads. In such cases also, the provision of logistics, transportation, food and other logistical support to the HSE personnel shall be in the scope of subcontractor in addition to the salary. After deployment of manpower by BHEL, the penalty for non-deployment specified above shall not be applicable.

## 6. COMPETENCY OF OPERATORS/ DRIVERS OF CRANE, WINCH, LIFTING/ CONSTRUCTION EQUIPMENT ETC.

i. The Operators/ Drivers of crane, winch, construction/ lifting equipment etc. shall be experienced and have valid driving license for the class of vehicle / machinery as applicable (like Crane/ Forklift/ Rig, Construction equipment driving license etc.).

ii. Minimum HMV driving license is required for all heavy equipment/ heavy vehicle (trailer/ Hyva /dumper /TM) operators at site.

iii. The subcontractor shall certify competence of these persons in writing as and when they are posted at site.

iv. Crane, Winch, Construction & lifting equipment operator should have certificate on subject course or experience certificate in employer letterhead.

v. Where state is providing license for operating crane, tractor and other construction vehicles, same to be ensured.

**Note:** In case the statutory requirements i.e. State or Central Acts and / or Rules as applicable like the Building and Other Construction Workers' Regulation of Employment and Conditions of Service- Act,1996 or State Rules (wherever notified), the Factories Act, 1948 or Rules (wherever notified), etc. are more stringent than above, the same shall be followed.

7. In case of any stringent requirement of BHEL's customer over and above the specifications mentioned in current document, the same shall also be required to be complied at site by subcontractor.

## 8. REFERENCES

The Safety Rules for Construction & Erection as outlined hereunder, while setting out a broad parameter of safety norms, are not exhaustive. The subcontractor and his agencies are advised to refer to the following statutory provisions as amended from time to time for details and strict compliance therewith.

### 8.1. FOR GREENFIELD PROJECTS

a) Building and Other Construction Workers (regulation of employment and conditions of service) Act, 1996 (briefly referred to as BOCW Act),
b) Building and other construction workers (regulation of employment and conditions of service) Central Rules, 1998 (briefly referred to as BOCW Rules) as adopted by the various State Governments,

## 8.2. For Expansion, Modification, Alteration and, Or Construction Activity Within An Existing Plant Operating As Per Approved Site Plan Under The Factories Act

a) Factories Act, 1948,
b) Factories Rules, as adopted by the various State Governments
c) BOCW Act
d) BOCW Rules
e) In case a new act/ statutory guideline/ modification/ consolidation of acts is implemented the same shall be required to be adhered by the subcontractor.
f) The latest amendment of the above-mentioned acts/ rules shall be followed at site.

# 9. BHEL POWER SECTOR HSE MANAGEMENT SYSTEM

The Systems and procedures of BHEL Power Sector HSE Management System shall be implemented by the subcontractor, including:

- HSE Procedure for Register of OHS Hazards and Risks
- HSE Procedure for Register of Environmental Aspects and Impacts
- HSE Procedure for Register of Regulations
- HSE Procedure for Training and Awareness
- HSE Procedure for Emergency Preparedness and Response Plan
- HSE Procedure for Permit to Work
- HSE Inspection and Other Formats

**Note:**

i. BHEL reserves the right to revise/ update these systems and procedure as per requirement to address any changing HSE needs

ii. BHEL will provide hard / soft copies of applicable HSE Procedures, Work Permits, Operational Control Procedures, Inspection/ Other Formats etc. that are necessary for ensuring safe work to the successful bidder at Site. It is the responsibility of the subcontractor to ensure availability of these documents before commencing work at site.

iii. The subcontractor can get soft copies of these documents from respective Region SCT/ HSE for reference. The signed hard copies of the same shall not be required to be submitted along with tender document

iv. Subcontractor shall use the Digital (Web & App-Based) HSE management Software Systems provided by BHEL whenever provided. In case not provided, hard copy systems will continue to be used. All information technology resources (Computers, mobile phones, mobile data, internet access etc.) for the use of such systems shall be ensured by the subcontractor.

# 10. CLEARANCE OF MONTHLY RUNNING BILLS SUBJECT TO SAFETY COMPLIANCE

i. The monthly running Bills of the subcontractor shall be released subject to compliance to HSE requirements as per checklist in Annexure H
ii. BHEL site HSE Head and Package In-charge shall be authorized to issue the clearance
iii. Site Construction Manager of BHEL shall be the final authority on the matter.

# 11. HSE PERFORMANCE EVALUATION

i. Subcontractor shall be assessed on monthly basis for HSE Compliance by BHEL Safety In-charge at site.
ii. The HSE evaluation shall be based on HSE Performance Evaluation System of BHEL covering the contractual, statutory and regulatory requirements of HSE.
iii. BHEL shall reserve the right to use these performance scores for evaluating bidder's capacity for future tenders
iv. If safety record of the subcontractor in execution of the awarded job is to the satisfaction of safety department of BHEL, issue of an appropriate certificate to recognize the safety performance of the subcontractor may be considered by BHEL after completion of the job, provided the execution performance is satisfactory.

# 12. HSE PENALTIES

i. Nonconformity of safety rules and safety appliances will be viewed seriously and BHEL has right to impose fines on the subcontractor for every instance of violation noticed.
ii. As per contractual provision HSE penalties shall be imposed on subcontractors for non-compliance on HSE requirement as per following format.
iii. Following are the applicable penalties for various Safety violations:

**Sub: MEMO for Penalty for non-compliances in Safety**

Following lapse (tick marked) was observed and penalty (in Rs.) is imposed as stated at the bottom of this memo. It is requested that such occurrences be please avoided in future.

| S. No | Nature of Non - Compliance | Penalty (in INR) | Remarks |
|---|---|---|---|
| **A. System Violations** | | | |
| 1 | Working without valid Work Permit/ HIRA/ Method Statement / JSA | 2000 | Per case |
| 2 | Controls as per Work Permit/ HIRA/MS/JSA not ensured | 2000 | Per case |
| 3 | Reported Safety Violations Not Closed within Stipulated Time | 1000-10000 | Per case |
| 4 | Absence of required Subcontractor Officials (Site Head, HS Head) in Safety Reviews/Meetings | 5000 | Per case |
| 5 | Not providing required PPEs (Safety Harness, Lifeline, Safety Net, Fall arrestor, Safety Helmet, Gloves, Shoes etc.) for the work by subcontractor | 2000 | Per case |
| **B. Competency/ Training/ Induction Violations** | | | |

| | | | |
|---|---|---|---|
| 1 | Incompetent personnel deployed for specialized jobs like height work, hot work, rigging, vehicle operation etc. (without valid license/ certificate etc.) | 3000 | Per case |
| 2 | Work without induction training & medical check | 2000 | Per case |
| 3 | Height Work without Vertigo Test and height work training | 2000 | Per case |
| **C. PPE Violations – Height Work** | | | |
| 1 | Not wearing/ hooking Double Lanyard Safety Harness while working at height (> 1.2 meters) or not anchoring to lifeline | 1000 | Per case |
| 2 | Not Providing Lifeline for height work | 3000 | |
| 3 | Unsafe platforms – without Top, Mid Rails and Toe-Guards for Height Work | 3000 | |
| 4 | Not providing secondary means of fall protection for height work (Safety Nets, Retractable Fall Arrestors etc.) | 3000 | Per case |
| **D. PPE Violations – General** | | | |
| 1 | Not wearing safety helmet | 1000 | Per case |
| 2 | Wearing of helmets without chin straps | 1000 | Per case |
| 3 | Not Wearing safety shoes | 500 | Per case |
| 4 | Not wearing gloves | 500 | Per case |
| 6 | Not using grinding goggles/ face shield during grinding/ cutting | 2000 | Per case |
| **E. Electrical Safety Violations** | | | |
| 1 | Broken/ exposed wires/ cables | 2000 | Per case per day |
| 2 | Electrical plug not used for connection/ hand machines | 1000 | Per case per day |
| 3 | Not using proper ELCBs for electrical equipment | 2000 | Per case per day |
| 4 | Improper earthing of welding & Other electrical machines (Lack of double earthing, improper/ untested earth pit etc.) | 2000 | Per case per day |
| 5 | Not using 24 V supply for lighting in confined spaces | 2000 | Per case |
| 6 | Cables haphazard/ blocking way/ not organized properly | 1000 | Per case per day |
| **F. Lifting & Rigging Violations** | | | |
| 1 | Using Sling/ Chain Pulley Block and other Small T&Ps without proper, traceable Tag and Test Certificate | 2000 | Per T&P per day |
| 2 | Using damaged slings or not slinging properly | 2000 | Per T&P per day |
| 3 | Use of lifting equipment without having valid Test certificate | 5000 | Per equipment per seven days |
| 4 | Lifting hooks used without latches | 2000 | Per hook per day |
| 5 | Not effectively barricading area below lifting activity | 5000 | Per case |
| 6 | Using untrained/ unqualified rigger | 5000 | Per case |
| **G. Housekeeping** | | | |
| 1 | Non-removal of scrap from platforms | 5000 | Per Event Per location per 7 days |
| 2 | Not conducting scheduled housekeeping drives | 5000 | Per drive |
| **H. Hot Work Safety Violations** | | | |
| 1 | Gas cutting without flash back arrestor at both ends | 5000 | Per machine per incidence |
| 2 | Gas cutting at height without fire blanket | 2000 | Per event |

| | | | |
|---|---|---|---|
| 3 | Not keeping gas cylinders vertically | 2000 | Per event |
| 4 | Lifting cylinders without cage or rolling of cylinders | 2000 | Per incidence |
| 5 | Leakage in gas cylinder | 2000 | Per incidence |
| **I. Vehicle Safety/ Operation** | | | |
| 1 | Not having valid driving license for the type of vehicle/ T&P | 2000 | Per driver per incidence |
| 2 | Two-wheeler entry in construction area | 2000 | Per vehicle |
| 3 | Using Hydra for material movement at site in unsafe manner | 2000 | Per case |
| 4 | Using Two Hydra in Tandem for material movement without proper precautions as per OCP | 2000 | Per case |
| 5 | Vehicles, Hydras, Cranes, Dumpers and Earth Movers not having automatic back horns linked to gear | 2000 | Per Equipment per day |
| 6 | Not providing proper hard barricades around excavations/ unpermitted areas | 5000 | Per location per day |
| 7 | Not using guide rope while transporting material using Hydra or Cranes | 2000 | Per event |
| 8 | Over speeding | 5000 | Per case |
| 9 | Using Conventional Hydra crane | 50000 | Per day /crane |
| **J. Accidents/ Incidents/ Near Misses** | | | |
| 1 | Non-reporting of Near Miss/ Incident | 20000 | Per case |
| 2 | Major Accident – Worker unable to resume work within 48 hrs | 100000 | Per incident |
| 3 | Fatal Accident | 500000 | Per incident |
| **K. Miscellaneous** | | | |
| 1. | Not providing the facility (drinking water, rest shed, labor colony etc. as per the specifications/ requirement) | 5000 | Per month per violation |
| 2. | Not nominating the required number of workers for training as per plan | 5000 | Per incidence |
| 3. | Lack of proper arrangement for disposal of sewage/ waste water/ effluents etc. | 10000 | Per incidence |

Details (if any) related to non- compliance (Name of persons, Nature of deficiency, etc.):

_____
_____
_____

Penalty Amount:

1. Rate as per above chart
2. No. of Persons/ machine/ event/ labor
3. No. of times the same error is repeated: Repetition factor
4. Total Penalty= 1. X 2. X 3. =

**Witnessed by:**

(Sub- Subcontractor representative) (BHEL representative)

Signature _____

_____

Name _____

_____

Distribution: 1 Copy: to Sub- subcontractor Site In-charge,
1 Copy to Site Construction Manager (BHEL)
1 Copy to Site Finance

**Note:**

i. In case the amount of penalty imposed by BHEL's Client on BHEL for Safety violation/ incident due to or in the area of the subcontractor is more than those indicated above, same shall be imposed back-to-back on the subcontractor. However, in case such an amount is less than the specified above, penalty amount indicated above shall be imposed on the subcontractor.

ii. For same violation only one penalty (higher of the two mentioned below) shall be applicable
   a. Penalty imposed by BHEL's Customer over BHEL.
   b. Penalty as indicated in current document.

iii. For repeated violation for the same equipment/ location, the penalty would be double of the previous penalty. Date of "Repeated violation" will be counted from subsequent days.

iv. For repeated fatal incident in the same Unit incremental penalty shall be imposed: The subcontractor will pay 2 times the previously paid penalty in case there is repeated major/ fatal incident under the same subcontractor for the same package in the same unit.

v. Any other non-conformity noticed not listed above will also be fined as deemed fit by BHEL. The decision of BHEL engineer is final on the above.

vi. If principal customer/statutory and regulatory bodies impose some penalty on HSE due to the non-compliance of the subcontractor the same shall be passed on to them.

vii. The penalty amount shall be recovered by BHEL Finance department from subcontractors from the RA/Final bill.

## 13. PUNITIVE ACTIONS FOR "CRITICAL SAFETY VIOLATIONS":

**"Critical Safety Violations" include:**

i. Not wearing required PPEs when provided and not following safe work procedure

ii. Taking unnecessary risks especially in height work, hot work, radiation work, lifting activity

iii. Coming to work under influence of sedatives like alcohol, drugs etc.

iv. Coming to work without ID Card/ Gate Pass (if provided)

v. Intimidating/ threatening at work

vi. Using cell phones during height work, hot work, lifting activity, driving.

In case any worker carries out any of the critical safety violations as above, BHEL reserves the right to enforce punitive action in following manner:

| | |
|---|---|
| **First Offence**: | 1 Punch on Gate Pass/ Induction Card/ ID Card etc. and 1-hour HSE Training. With one day off from duty |
| **Second Offence:** | 2 Punches and 2-hours HSE Training with one day off from duty |

| | |
|---|---|
| **Third Offence:** | 3 Punches and the worker will be dismissed. Gate pass to be confiscated |

In case any employee of subcontractor carries out any of the critical safety violations as above, subcontractor Site In-charge shall issue warning letter to concerned employee with copy to BHEL

**Note:**

i. For above violations, guilt of the worker/ employee has to be established through appropriate evidences and records maintained.

ii. If worker/ employee has not been given the required PPEs and safety equipment by the agency and/or not facilitated by the agency to follow safety rules, he/ she will not be considered liable but the agency will be penalized as per penalty provision in this document. In such cases, the subcontractor shall not pass the penalty over to the worker/ employee through wage deduction etc.

iii. These critical safety violations and their consequences shall be shared with all workers and employees during induction and other training programs/ meetings, toolbox talks etc.

iv. Gate Pass shall have provision of Tagging as indicated above

v. The appellate authority (only for final dismissal) in this case shall be the BHEL Site In-charge whose decision shall be final on the matter and binding on all parties.

## 14. LEGAL IMPLICATIONS

Any legal Costs incurred by BHEL, on account of accidents taking place in the activities of the subcontractor, shall be debited to the subcontractor on actual cost basis.

For any accident occurring at site to any worker/ employee of the subcontractor leading to legal implications to BHEL Employee/ Management shall be safeguarded by BHEL legal department. All legal expenses incurred by BHEL on this account shall be recovered from the subcontractor. The accident also includes fire, loss of property or life at site.

## 15. HSE REVIEW MEETING

i. Subcontractor Site In-charge and HSE In-charge shall attend the HSE Review Meeting as and when called by BHEL.

The indicative agenda points are given below:

a) Implementation of earlier MOM points
b) Compliance Status of HSE Observations
c) Incidents & Near Misses, their Root Causes and Actions Taken
d) HSE performance review
e) HSE inspection findings
f) HSE audit and CAPA
g) HSE training
h) Health check-up camp
i) HSE planning for the erection and commissioning and installation activities in the coming month

j) HSE reward and promotional activities

ii. MOM on the discussion along with HSE observations will be circulated to the subcontractor for action.

iii. The subcontractor shall close the observations to the satisfaction of BHEL within stipulated time frame

## 16. OTHER REQUIREMENTS

i. If the subcontractor fails to improve the standards of safety in its operation to the satisfaction of BHEL after being given reasonable opportunity to do so and/or if the subcontractor fails to take appropriate safety precautions or to provide necessary safety devices and equipment or to carry out instruction regarding safety issued by BHEL, BHEL shall have the right to take corrective steps and the cost shall be debited to the subcontractor with applicable overheads.

ii. If the subcontractor succeeds in carrying out its job in time without any fatal or disabling injury incident and without any damage to property BHEL may, at its sole discretion, favorably consider to reward the subcontractor suitably for the performance.

iii. In case of any damage to property due to lapses by the subcontractor, BHEL shall have the right to recover the cost of such damages from the subcontractor after holding an appropriate enquiry.

iv. The subcontractor shall take all measures at the sites of the work to protect all persons from incidents and shall be bound to bear the expenses of defense of every suit, action or other proceeding of law that may be brought by any persons for injury sustained or death owing to neglect of the above precautions and to pay any such persons such compensation or which may with the consent of the subcontractor be paid to compromise any claim by any such person, should such claim proceeding be filed against BHEL, the subcontractor hereby agrees to indemnify BHEL against the same.

v. The subcontractor shall not employ men below the age of 18 years and women on the work of painting with products containing lead in any form. Wherever men above the age of 18 are employed on the work of lead painting, overalls shall be supplied by the subcontractor to the workmen and adequate facilities shall be provided to enable the working painters to wash during the cessation of work.

vi. The subcontractor shall notify BHEL of his intention to bring to site any equipment or material which may create hazard.

vii. BHEL shall have the right to prescribe the conditions under which such equipment or materials may be handled and the subcontractor shall adhere to such instructions.

viii. BHEL may prohibit the use of any construction machinery, which according to the organization is unsafe. No claim for compensation due to such prohibition will be entertained by BHEL.

# 17. MEMORANDUM OF UNDERSTANDING:

After award of work, subcontractors are required to enter into a memorandum of understanding as given below:

## Memorandum of Understanding

BHEL, Power Sector Region is committed to Health, Safety and Environment Policy (HSE Policy).

M/s……..do hereby also commit to comply with the same HSE Policy while executing the Contract Number _____

M/s……..have gone through and understood all the HSE requirements of the contract including HSE manpower, tools & equipment, systems & procedures, and agree to fulfill the same as a minimum. Any additional resources and support required for ensuring fulfillment of HSE Objectives shall be provided by subcontractor at no extra cost.

M/s…….. agree that in case they fail to comply to the HSE requirements as stipulated in the contract, BHEL shall have the right to implement the same and the cost shall be recovered from the subcontractor with applicable overheads.

M/s…….. shall ensure that safe work practices as per the HSE plan. Spirit and content therein shall be imbibed in all workers and supervisors for compliance.

In addition to this, M/s……..shall comply to all applicable statutory and regulatory requirements which are in force in the place of project and any special requirement specified in the contract document of the principal customer.

M/s……..shall co-operate in HSE audits/inspections conducted by BHEL /customer/ third party and ensure to close any non-conformity observed/reported within prescribed time limit.

M/s…….. agree that the subcontractor shall seek HSE clearance as per BHEL format before each RA bill as mentioned in clause no. 9. The penalty amounts for not providing Safety manpower and various Safety violations have also been reviewed and agreed.

M/s…….. agree to share the HSE Costs (running costs) of common facilities created by BHEL on proportional to contract value basis as calculated at Site by BHEL.

Signed by authorized representative of M/s ----------

Name :

Place & Date:

# SECTION B

# OPERATIONAL REQUIREMENTS

# 1. PURPOSE:

1.1. The purpose of this HSE Plan is to provide for the systematic identification, evaluation, prevention and control of general workplace hazards, specific job hazards, potential hazards and environmental impacts that may arise from foreseeable conditions during installation and servicing of industrial projects and power plants.

1.2. This document shall be followed by BHEL's subcontractors at all installation and servicing sites. In case customer specific documents are to be implemented, this document will be followed in conjunction with customer specific documents in complementary manner.

1.3. Although every effort has been made to make the procedures and guidelines in line with statutory requirements, in case of any discrepancy wherein the relevant statutory guidelines supersedes this document, the same shall be followed.

1.4. In case there's any specific HSE requirement from BHEL's Client, not explicitly indicated in this document the same shall be required to be fulfilled as per the decision of BHEL Site construction manager.

# 2. SCOPE:

The document is applicable to BHEL's Subcontractors at all installation / servicing activities of BHEL Power Sector as per the relevant contractual obligations

# 3. OBJECTIVES AND TARGETS:

i. To achieve "Zero Incident at Site"
ii. 100% compliance to all legal/statutory requirements related to EHS.
iii. 100% Health, Safety and Environmental Induction training attendance for all workers.
iv. 100% High Risk activities to be carried out only after approved Method Statement, HIRA / Aspect-Impact / JSA / OCP and Permit to Work are implemented.
v. 100% PPEs compliance in high and medium risk activities.
vi. 100% incident reporting, recording and reviewing for corrective actions.
vii. Regular Safety Reviews to assess HSE program compliance and closure of any recognized gaps to improve safety management and incident prevention
viii. Prevent injury and ill health of all workers at site ('Workers' refers to all personnel including managerial, supervisory, professional, technical, clerical and other workers including contract laborers)
ix. Prevent pollution to environment
x. Ensure the Health and Safety of all persons at work site is not adversely affected by the work.
xi. Ensure protection of environment of the work site.
xii. Comply at all times with the relevant statutory and contractual HSE requirements.
xiii. Provide trained, experienced and competent personnel. Ensure medically fit personnel only are engaged at work.
xiv. Provide and maintain plant, places and systems of work that are safe and without risk to health and the environment.

xv. Provide all personnel with adequate information, instruction, training and supervision on the safety aspect of their work.
xvi. Effectively control, co-ordinate and monitor the activities of all personnel on the Project sites including subcontractors in respects of HSE.
xvii. Establish effective communication on HSE matters with all relevant parties involved in the Project works.
xviii. Ensure that all work planning considers all persons that may be affected by the work.
xix. Ensure fitness testing of all T&Ps/Lifting appliances like cranes, chain pulley blocks etc. are to be certified by competent person.
xx. Ensure timely provision of resources to facilitate effective implementation of HSE requirements.
xxi. Ensure continual improvements in HSE performance.
xxii. Ensure conservation of resources and reduction of wastage.
xxiii. Capture the data of all incidents including near misses, process deviation etc. Investigate and analyze the same to find out the root cause.
xxiv. Ensure timely implementation of correction, corrective action and preventive action.
The subcontractor shall also comply with HSE Targets stipulated by BHEL from time to time.

## 4. BHEL HEALTH, SAFETY & ENVIRONMENT POLICY:

In BHEL, Health, Safety and Environment (HSE) responsibilities are driven by our commitment to protect our employees and people we work with, community and environment. BHEL believes in zero tolerance for unsafe work/non-conformance to safety and in minimizing environmental footprint associated with all its business activities. We commit to continually improve our HSE performance by:

- Developing safety and sustainability culture through active leadership and by ensuring availability of required resources.
- Ensuring compliance with applicable legislation, regulations and BHEL systems.
- Taking up activities for conservation of resources and adopting sound waste management by following Reduce/Recycle/Reuse approach.
- Continually identifying, assessing and managing environmental impacts and Occupational Health & Safety risks of all activities, products and services adopting approach based on elimination/ substitution/reduction/control.
- Incorporating appropriate Occupational Health, Safety and Environment criteria into business decisions, design of products & systems and for selection of plants, technologies and services.
- Imparting appropriate structured training to all persons at workplace and promoting awareness amongst customers, subcontractors and suppliers on HSE issues.
- Reviewing periodically this policy and HSE Management Systems to ensure its relevance, appropriateness and effectiveness.
- Communicating this policy within BHEL and making it available to interested parties.

**Chairman & Managing Director/ BHEL**

# 5. ILLUSTRATIVE RESPONSIBILITIES OF SUBCONTRACTOR EMPLOYEES

## 5.1 HSE - A LINE RESPONSIBILITY

i. HSE is a “Line Responsibility”.
ii. The term "Line" includes management, Executives, Supervisors, Foremen, and Workers who are part of the workforce. Line is to be fully involved in HSE Planning & Implementation with the aid and advice of HSE organization.
iii. “Line”, having control of resources and manpower is responsible for overall implementation of HSE Systems and closure of HSE observations.

## 5.2 SITE IN -CHARGE:

i. Shall sign Memorandum of Understanding (MoU)
ii. Shall ensure availability of all necessary resources required for implementation of HSE at Site
iii. Shall engage qualified HSE Officer(s) and supervisors (s)
iv. Shall adhere to the rules and regulations mentioned in this code, practice very strictly in area of work in consultation with concerned engineer and the safety coordinator.
v. Shall screen all workmen for health and competence requirement before engaging for the job and periodically thereafter as required.
vi. Shall not engage any employee below 18 years.
vii. Shall arrange for all necessary PPEs like safety helmets, belts, full body harness, shoes, face shield, hand gloves etc. before starting the job.
viii. Shall ensure that all T&Ps engaged are tested for fitness and have valid certificates from competent person.
ix. Shall ensure closure of all HSE non-conformities reported by BHEL or observed during internal inspection by providing appropriate resources in a timely manner.
x. Shall ensure the implementation of provisions of applicable acts and rules pertaining to HSE.
xi. Shall ensure availability of updated (Hazard Identification and Risk Assessment) Register for the area of activity
xii. Shall ensure availability of Method Statements & Job Safety Analysis for all hazardous activities
xiii. Shall ensure necessary controls to minimize risk in all applicable hazardous activities including Height Work, Hot Work, Lifting & Rigging, Confined Space, Maintenance, excavation, Radiography, Loading/ Unloading, Drilling/ Blasting etc.
xiv. Shall ensure implementation of HSE requirements mentioned in this document and as specified in the BHEL HSE management System including training, inspection, awareness, reporting etc.
xv. Shall ensure that person working above 2.0 meter should use Safety Harness tied to a life line/stable structure.
xvi. Shall ensure a secondary means of fall protection (Safety Net, Retractable Fall Arrestor etc.) for preventing fall from height
xvii. Shall ensure that materials are not thrown from height. Cautions to be exercised to prevent fall of material from height.

xviii. Shall report all incidents (Fatal/Major/Minor/Near Miss) to the Site engineer /HSE officer of BHEL.
xix. Shall ensure that Horseplay is strictly forbidden.
xx. Shall ensure that adequate illumination is arranged during night work.
xxi. Shall ensure that all personnel working under subcontractor are working safely and do not create any Hazard to self and to others.
xxii. Shall ensure display of adequate signage/posters on HSE.
xxiii. Shall ensure that mobile phone is not used by workers while working.
xxiv. Shall ensure conductance of HSE audit, mock drill, medical camps, induction training and training on HSE at site.
xxv. Shall ensure full co-operation during HSE audits.
xxvi. Shall ensure submission of look-ahead plan for procurement of HSE equipment's and PPEs as per work schedule.
xxvii. Shall ensure good housekeeping.
xxviii. Shall ensure adequate valid fire extinguishers are provided at the work site.
xxix. Shall ensure availability of sufficient number of toilets (preferably bio-toilets) /restrooms and adequate drinking water at work site and labor colony.
xxx. Shall ensure adequate emergency preparedness.
xxxi. Shall be member of site HSE committee and attend all meetings of the committee
xxxii. Power source for hand lamps shall be maximum of 24 v.
xxxiii. Temporary fencing should be done for open edges if Hand – railings and Toe-guards are not available
xxxiv. To record all incidents including near miss and report to BHEL and to ensure analysis & corrective actions for the same
xxxv. Shall conduct weekly Safety Walks in the work area and record the findings.
xxxvi. Construction of Canteen at Site, Office Infrastructure: Printer, PC, Fire Extinguishers etc.
xxxvii. Shall analysis HSE Performance regularly in work area and take steps to improve the same
xxxviii. Shall ensure stoppage of work in case of unacceptable Safety hazards

## 5.3 HSE OFFICER:

i. Carry out safety inspection of Work Area, Work Method, Men, Machine & Material, P&M and other tools and tackles.
ii. Facilitate inclusion of safety elements into Work Method Statement and creation of Job Safety Analysis (JSA)
iii. (HSE Head) To prepare deployment plan of HSE personnel for all shifts, so as to ensure constant supervision of all areas. The plan to be submitted to BHEL
iv. Highlight the requirements of safety through Tool-box / other meetings.
v. Help concerned HOS to prepare Job Specific instructions/ JSA for critical jobs.
vi. Conduct investigation of all incident/dangerous occurrences & recommend appropriate safety measures.
vii. Advice & co-ordinate for implementation of HSE Systems & Procedures.
viii. To stop work in case of any critical safety violation until the violation is cleared
ix. Convene HSE meeting & minute the proceeding for circulation & follow-up action.

x. Plan procurement of PPE & Safety devices and inspect their healthiness.
xi. Report to BHEL on all matters pertaining to status of safety and promotional program at site level.
xii. Facilitate administration of First Aid
xiii. Facilitate screening of workmen and safety induction.
xiv. Conduct fire Drill and facilitate emergency preparedness
xv. Design campaigns, competitions & other special emphasis programs to promote safety in the workplace.
xvi. Apprise BHEL on safety related problems.
xvii. Notify site personnel non-conformance to safety norms observed during site visits / site inspections.
xviii. Recommend to Site In charge, immediate discontinuance of work until rectification, of such situations warranting immediate action in view of imminent danger to life or property or environment.
xix. To decline acceptance of such PPE / safety equipment that do not conform to specified requirements.
xx. Encourage raising Near Miss Report on safety along with, improvement initiatives on safety.
xxi. Shall work as interface between various agencies such customer, package-in-charges, subcontractors on HSE matters.

## 5.4 HSE SUPERVISOR:

i. All requirements as per 5.1
ii. To monitor allotted area for Safety violations, take required action and inform the concerned Safety Supervisor / Officer
iii. To assist HSE Officer

## 5.5 PACKAGE IN-CHARGES, ENGINEERS & ALL EMPLOYEES:

i. To be aware of, get involved in and ensure implementation of all HSE related Systems and Procedures including but not limited to:
    a. BHEL HSE Management System including HSE Procedures and OCPs, HIRA, JSA etc.
    b. Work Permit System
    c. Emergency Preparedness Response Plans
    d. Contractual HSE requirements
    e. Legal Requirements
    f. Penalty System
    g. Training requirements
ii. To ensure that the persons engaged in respective area follow the safety rules like using appropriate PPEs.
iii. To develop Method Statements and ensure availability of Job Safety Analysis for all activities in scope
iv. To ensure that the reported HSE non-conformities in the work area are resolved immediately before resuming work
v. To record all incidents including near miss and report to BHEL.

vi. To adopt safe working practices at all times and act as role model for Safety
vii. To take immediate corrective action actions in case any non-conformity is observed on product / process / system with respect to Occupational Health, Safety and Environment.
viii. In case any particular activity / work has extremely high consequential risk or high environmental impact, same shall be brought to the notice of BHEL Package In-charge before starting the work.
ix. To interfere/ stop work as & when identified unsafe.
x. To maintain & promote improved level of house-keeping all the time at site.
xi. To support/co-operate with audit team members as & when safety audits are carried out.
xii. To involve in investigation, if any incident occurs in his work area.
xiii. To participate in safety promotional programs
xiv. To attend the safety committee meeting, if member/invitee
xv. To ensure that only fit T&Ps and qualified persons are engaged for all activities.
xvi. Shall ensure that person working above 2.0 meter should use Safety Harness tied to a life line/stable structure.
xvii. Shall ensure that materials are not thrown from height. Cautions to be exercised to prevent fall of material from height.
xviii. Shall ensure that all T&Ps engaged are tested for fitness and have valid certificates from competent authorities.

# 6. HSE PLANNING BY SUBCONTRACTOR:

## 6.1 HAZARD ANALYSIS & RISK ASSESSMENT (HIRA), METHOD STATEMENT (MS) & JOB SAFETY ANALYSIS (JSA):

i. Subcontractor shall identify all OHS Hazards and Risks applicable to all activities in scope and plan & implement the required control measures. HIRA Register shall be maintained.
ii. Subcontractor shall develop Method Statements & Job Safety Analysis documents for all hazardous activities in scope and ensure the required control measures. Job Safety Analysis is to be attached along with any Work Permit request

## 6.2 REGISTER OF REGULATIONS:

Subcontractor shall prepare a register of applicable rules and regulations in the scope and plan to ensure compliance.

HIRA Register, Method Statements, Job Safety Analysis and Register of Regulations are dynamic documents and shall be revised (as applicable):

i. At fixed frequency of 3 months
ii. Addition/ deletion/ modification of a process/ activity
iii. After an accident/ incident
iv. After any change in applicable rules/ regulations/ laws.

## 6.3 MONTHLY HSE PLAN COVERING THE FOLLOWING AS A MINIMUM SHALL BE PREPARED AND SUBMITTED TO BHEL FOR APPROVAL:

i. HSE Trainings covering all activities/ hazards/ workers

ii. HSE Inspection Plan covering all areas/ activities/ equipment/ hazards

iii. HSE Activities: Safety walks, Awards, housekeeping, reviews etc.

**Note:** Online/ App-based system shall be used for HSE Planning and Implementation/ Update whenever provided by BHEL otherwise Hard-copy based system shall continue

### 6.4 MONTHLY HSE PLANNING & REVIEW OF HSE ACTIVITIES ALONG WITH BHEL:

Monthly planning and review of HSE activities shall be carried out by subcontractor as per provided **format** jointly along with BHEL

## 7. MOBILIZATION OF MACHINERY/EQUIPMENT/TOOLS BY SUBCONTRACTOR:

i. Subcontractor shall notify the engineer, of his intention to bring on to site any equipment or any container, with liquid or gaseous fuel or other substance which may create a hazard. The Engineer shall have the right to prescribe the condition under which such equipment or container may be handled and used during the performance of the works and the subcontractor shall strictly adhere to such instructions. The Engineer shall have the right to inspect any construction tool and to forbid its use, if in his opinion it is unsafe. No claim due to such prohibition will be entertained.

ii. As a measure to ensure that machinery, equipment and tools being mobilized to the construction site are fit for purpose and are maintained in safe operating condition and complies with legislative and owner requirement, inspection shall be arranged by in-house competent authority for acceptance as applicable. Inspection by Third Party competent person shall be arranged:
   a. Before first time use at site
   b. After carrying out any modification
   c. After repairs subsequent to involvement in any accident/ incident

iii. As a further measure to ensure that machinery, equipment and tools being mobilized to the construction site are fit for purpose and are maintained in safe operating condition and comply with legislative and owner requirement, inspection as per provided format shall be arranged by in-house expert / competent authority (preferable) for acceptance. The equipment considered for this purpose shall include all those in the T&P list in the tender document.

## 8. MOBILIZATION OF MANPOWER BY SUBCONTRACTOR:

i. As a measure to ensure that manpower being mobilized to the construction site is fit and competent for safe working, screening arrangement shall be made by the sub-subcontractor to ensure competency and fitness through following measures:

a) **Medical Checkup:** Examination of medical fitness shall be conducted through qualified medical professional for all workers to be deployed as per provided **format**. For height workers, vertigo (height phobia) test to be carried out as qualification criteria as per Annexure K and recorded in provided **format**.

b) **Induction Training**: Induction training of all workers to be ensured as per **provided procedure and format**. Training evaluation to be carried out and training to be repeated if not passed

c) Only on successfully meeting above criteria, permanent gate passes to be issued

ii. The subcontractor shall arrange induction and regular health check of their employees as per schedule VII of BOCW rules by a registered medical practitioner.

iii. The subcontractor shall take special care of the employees affected with occupational diseases under rule 230 and schedule II of BOCW Rules. The employees not meeting the fitness requirement should not be engaged for such job.

iv. Ensure that the regulatory requirements of excessive weight limit (to carry/lift/ move weights beyond prescribed limits) for male and female workers are complied with.

v. Appropriate accommodation to be arranged for all workmen in hygienic condition.

vi. Cost of contractual, statutory and regulatory requirements like Training, medical checks, PPEs etc. shall not be transferred to the workers and such activities shall be considered as part of the job.

## 9. PROVISION OF PERSONAL PROTECTIVE EQUIPMENT (PPES):

i. Personnel Protective Equipment (PPEs), shall be provided by the subcontractor to all workers as per requirement of the job.

ii. The choice of PPEs to ensure multiple (at least more than 1) means of protection against any hazard. All applicable safety precautions for a job shall be ensured notwithstanding the duration or perceived importance of the task.

iii. The applicability of PPEs shall be as per the concept of Hierarchy of controls, i.e.:

iv. Elimination->Substitution->EngineeringControls->AdministrativeControls-PPEs

v. Relying solely on PPEs without ensuring necessary controls to be strictly avoided.

vi. The following matrix recommends usage of minimum PPEs against the respective job.

| Activity | Type of Protection | | | | | | Remarks, if any |
|---|---|---|---|---|---|---|---|
| | Hand | Eye | Ear | Body | Respiratory | Others | |
| Gas Welding & Cutting | LG | WG | - | LA | *SCBA/ OLBA | - | * for confined space |
| Electric Arc Welding | LG | HMWS | - | LA | *SCBA/ OLBA | - | * for confined space |
| Rigging | CG | SG | - | | | | -- |
| Working at Height | - | SG | - | DLFBH | - | *FAS | * for vertical columns |
| Grinding & Chipping | CG | FS / SG | - | LA | - | - | -- |
| Working in High Noise | - | - | EP / EM | - | - | - | -- |
| Handling of Cement Concrete | RG | SG | - | - | DM | - | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Blasting | CG | SG | EP* | - | - | - | * at noise area |
| Excavation | CG | SG | - | - | DM | - | *Gum boot in place of Safety shoe for foot |
| Chemical Handling | PVCG | CSG | - | PVCA | - | - | *Full body rubber suit with hood |
| Electrical and C&I | ERG* | SG | - | - | - | - | *For high voltages |
| Sand/shot blasting | CG | - | EP/ EM | CA | SAMH | - | |

**ABBREVIATIONS**: FS: Face Shield, CSG: Chemical splash goggles, HMWS: Helmet mounted welder's shield, GB: gum boot, DLFBH: Double lanyard full body harness, SG: Safety goggles, DM: Dust mask, SAMH L Supplied air mask/hood, EP/EM: Ear plug/Ear Muff, CG: Cotton hand gloves, LG: Leather hand gloves, LA: Leather apron, RG: Rubber gloves, PVCG: PVC Gloves, PVCA: PVC Apron, SCBA: Self-contained breathing apparatus, WG: Welding goggles, ERG: Electrical Rubber Gloves. OLBA: Online breathing apparatus

The list is not exhaustive. Additional PPEs to ensure Safe Work may need to be deployed as per the requirement of the task at no additional cost.

vii. The PPEs shall conform to the relevant standards as below (illustrative list) and bear ISI mark.

**RELEVANT IS-CODES FOR PERSONAL PROTECTION**

| PPEs | IS Codes |
|---|---|
| Industrial Safety Helmets. | IS: 2925 – 1984 |
| Rubber gloves for electrical purposes. | IS: 4770 – 1968 |
| Industrial Safety Gloves (Leather &Cotton Gloves). | IS: 6994 – 1973 (Part-I) |
| Leather safety boots and shoes. | IS: 1989 – 1986 (Part-I-II) |
| Industrial and Safety rubber knee boots. | IS: 5557 – 1969 |
| Code of practice for selections care and repair of Safety footwear. | IS: 6519 – 1971 |
| Leather Safety footwear having direct molding sole. | IS: 11226 – 1985 |
| Eye protectors. | IS: 5983 – 1978 |
| Ear protectors. | IS: 9167 – 1979 |
| Eye & Face protection during welding | IS: 1179-1967 |
| Industrial Safety Belts and Harness | IS: 3521 – 1983 |
| Guide for selection of industrial Safety equipment for body protection | IS:8519 -1977 |
| Respiratory Protective Devices | IS:9473-2002,14166-1994,14746-1999 |

viii. Where workers are employed in sewers and manholes, which are in use, the subcontractor shall ensure that the manhole covers are opened and ventilated at least for an hour before the workers are allowed to get into manhole, and the manholes so opened shall be cordoned off with suitable railing and provided with warning signals or boards to prevent incident to the public

ix. All the personnel and visitors shall mandatorily use safety helmet (with company logo), safety shoe and reflective vests, in addition to any other PPEs as deemed appropriate for the area of work/ visit.

x. Following Color scheme for Helmets shall be followed:
   a. Workmen: Yellow
   b. Safety staff: Green or white with green band
   c. Electrician: Red
   d. Others including visitors: White
   e. For height workers, special marking on helmets besides indication on Gate Pass/ ID Card

xi. The subcontractor shall maintain register for issue and receipt of PPEs.

xii. All the PPEs shall be checked for quality before issue and the same shall be periodically re-checked. The users shall be advised to check the PPEs themselves for any defect before putting on. The defective ones shall be replaced.

xiii. The Helmets shall have logo or name (abbreviation of agency name permitted) affixed or printed on the front.

xiv. The body harnesses shall be serial numbered.

# 10. ARRANGEMENT OF INFRASTRUCTURE:

## 10.1 DRINKING WATER:

i. Drinking water shall be provided and maintained at suitable places at different elevations such that minimum quantity of 5 liters is available for each worker during the day.

ii. Drinking water tank shall be so installed so as to be available within 200 meters of each working area

iii. Container should be labeled as “Drinking Water” in languages understood by the workers

iv. Cleaning of the container shall be ensured at least once in a week. Mild cleaning detergents as used for cleaning vessels shall be applied and scrubbers (3M or equivalent) shall be used for removing scales and deposits on the inside surface. The tank shall be thoroughly cleaned with potable water only before it is refilled (also applicable to labor colony).

v. Suitability of water source for drinking to be tested as per IS10500 at least once in six months.

## 10.2 WASHING FACILITIES:

i. In every workplace, adequate and suitable facilities for washing shall be provided and maintained.

ii. Separate and adequate cleaning facilities shall be provided for the use of male and female workers. Such facilities shall be conveniently accessible and shall be kept in clean and hygienic condition and dully illuminated for night use.

iii. Water suitable for washing and not for drinking shall be clearly indicated as “Not for Drinking” in language understood by workers.

iv. Overalls shall be supplied by the subcontractor to the workmen and adequate facilities shall be provided to enable the painters and other workers to wash during the cessation of work.

## 10.3 LATRINES AND URINALS:

i. Latrines and urinals shall be provided in every work place as indicated in Section A
ii. Urinals shall also be provided at different elevations.
iii. They shall be adequately lighted and shall be maintained in a clean and sanitary condition at all times, by appointing designated person.
iv. Separate facilities shall be provided for the use of male and female worker if any.

## 10.4 PROVISION OF REST SHEDS FOR WORKERS DURING REST PERIOD:

Proper Rest Shed (s) with shelter shall be provided for rest during break so as to accommodate all workers as indicated in Section A

## 10.5 MEDICAL FACILITIES:

### 10.5.1 GENERAL

i. Provision of Medical Center, Ambulance etc. shall be as per Section A of this document
ii. Medical waste shall be disposed as per prevailing legislation (Bio-Medical Waste – Management and Handling Rules, 1998)
iii. Every injury shall be treated, recorded and reported.
iv. All First Aid injuries shall be recorded as per provided Format
v. List of qualified first aiders and their contact numbers to be displayed at conspicuous places.

### 10.5.2 FIRST AIDER/ FIRST AID BOX

i. The first aider along with facilities should be available at a point nearest to the work location wherein majority of the workers are working.
ii. The subcontractor shall provide necessary first aid facilities as per schedule III of BOCW. At every work place first aid facilities shall be provided and maintained.
iii. The first aid box shall be kept by first aider who shall always be readily available during the working hours of the work place. His name and contact no to be displayed on the box.
iv. The first aid boxes should be placed at various elevations so as to make them available within the reach and at the quickest possible time.
v. The first aid box shall be distinctly marked with a Green Cross on white background.
vi. Details of contents of first aid box is given in Annexure J
vii. A slip of contents shall be pasted on the First Aid Box with following details
viii. Monthly inspection of First Aid Box shall be carried out by the owner as per provided format
ix. The subcontractor should conduct periodical first –aid classes to keep his supervisor and Engineers properly trained for attending to any emergency.

### 10.5.3 HEALTH CHECK UP

The persons engaged at the site shall undergo health check-up as per provided format before induction. In addition, the persons engaged in the following works shall undergo health check-up at least once in a year:

i. Height workers
ii. Drivers/crane operators/riggers
iii. Confined space workers
iv. Shot/sand blaster
v. Welding and NDE personnel

### 10.5.4 HEIGHT PHOBIA/ VERTIGO TEST:

i. The persons engaged in working at heights (above 2 meters) to be assessed for Vertigo and associated conditions and recorded as per provided format. Suggested Vertigo Test Procedure is given in Annexure K
ii. Such workers are to be allowed only on successful completion of test, otherwise shall be allocated ground-based jobs.
iii. IDs / Height passes shall be issued to such workers, besides special markings on helmets for easy identification.

### 10.5.5 PROVISION OF CANTEEN FACILITY:

i. Canteen facilities shall be provided for the workmen of the project inside the project site where worker strength is 250 or more.
ii. Proper cleaning and hygienic condition shall be maintained.
iii. Proper care should be taken to prevent biological contamination.
iv. Adequate drinking water should be available at canteen.
v. Fire extinguisher shall be provided inside canteen.
vi. Regular health check-up and medication to the canteen workers shall be ensured as per applicable regulations.
vii. Canteen waste to be disposed of in hygienic manner

## 10.6 PROVISION OF ACCOMMODATION/LABOR COLONY FOR WORKFORCE:

i. Proper accommodation for workforce to be provided in line with minimum requirements indicated in Section A
ii. Labor colony shall be inspected each week by HSE Officer and report submitted to BHEL as per provided format

## 10.7 PEST CONTROL:

Regular pest control should be carried out at all offices, mainly laboratories, canteen, labor colony and stores.

## 10.8 SCRAPYARD:

i. In consultation with customer, scrapyard shall be developed to store metal scrap, wooden scrap, waste, hazardous waste.
ii. Scrap/Waste shall be segregated as Bio-degradable and non-bio-degradable and stored separately.

## 10.9 ILLUMINATION:

i. The subcontractor shall arrange at his cost adequate lighting facilities e.g. flood lighting, hand lamps, area lighting etc. at various levels for safe and proper working operations at dark places and during night hours at the work spot as well as at the pre-assembly area.
ii. Lamp (hand held) shall not be powered by mains supply but either by 24V or dry cells.
iii. Lamps shall be protected by suitable guards where necessary to prevent danger, in case of breakage of lamp.
iv. Emergency lighting provision for night work shall be made to minimize danger in case of main supply failure.
v. Adequate and suitable light shall be provided at all work places & their approaches including passage ways as per IS: 3646 (Part-II).

SUITABLE ILLUMINATION LEVELS FOR VARIOUS AREAS SHALL BE DECIDED BASED ON BROAD GUIDELINES INDICATED BELOW:

| S. No. | Location | Lux Level (lumens/sqm) |
|---|---|---|
| A. | **Construction Site** | |
| 1 | Outdoor areas like store yards, entrance and exit roads | 20 |
| 2 | Platforms | 50 |
| 3 | Entrances, corridors and stairs | 100 |
| 4 | General illumination of work area | 150 |
| 5 | Rough work like fabrication, assembly of major items | 150 |
| 6 | Medium work like assembly of small machined parts | 300 |
| 7 | Fine work like precision assembly, precision measurements etc. | 700 |
| 8 | Sheet metal works | 200 |
| 9 | Electrical and instrument labs | 450 |
| B. | **Office** | |
| 1 | Outdoor area like entrance and exit roads | 20 |
| 2 | Entrance halls | 150 |
| 3 | Corridors and lift cars | 70 |
| 4 | Lift landing | 150 |
| 5 | Stairs | 100 |
| 6 | Office rooms, conference rooms, library reading tables | 300 |
| 7 | Drawing table | 450 |
| 8 | Manual telephone exchange | 200 |

vi. Illuminations shall be inspected on weekly basis as per provided **format** using a calibrated lux meter.

# 11. HSE TRAINING & AWARENESS:

## 11.1 TRAINING PLAN:

i. All training programs to be carried out in a planned manner. Monthly/ Annual Training Calendar to be submitted to BHEL for approval and shall cover HSE Training requirements of all activities, workers, hazards applicable to the area(s) of work.
ii. Subcontractor shall nominate workers as per the schedule of specific training plan, failing which, penalty shall be imposed.
iii. Training records of all workers along with attendance, signatures, faculty details etc. shall be maintained in soft/ hard copy as per provided **formats**.
iv. Each labor should undergo at least 0.5% of total man-hours worked in HSE training.

## 11.2 HSE INDUCTION TRAINING

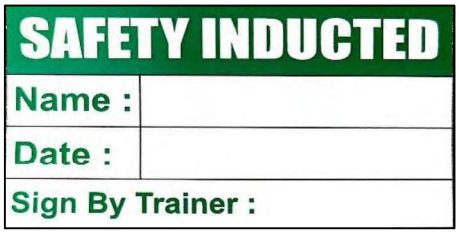
i. All persons entering into project site shall be given HSE induction training by the HSE officer of BHEL /subcontractor before being assigned to work.
ii. The induction training shall be imparted through audio-visual medium (Classroom specialized training), and shall be minimum of 1 Complete Day.
iii. Evaluation to be carried out after training and training shall be repeated in case of failure.
iv. Safety Induction Card shall be printed by Subcontractor and provided to all trained workers. A Safety induction book shall also be printed and issued to each worker after induction training (Format for the same may be provided by BHEL).
v. Induction training subjects shall include but not limited to:

   a. Briefing of the Project details.
   b. Safety objectives and targets.
   c. Site HSE rules.
   d. Critical Safety Violations and consequences
   e. Site HSE hazards and aspects.
   f. First aid facility.
   g. Emergency Contact No.
   h. Incident & Near Miss reporting.
   i. Fire prevention and emergency response.
   j. Rules to be followed in the labor colony (if applicable)
   k. Accident case studies

vi. General:

   a. Proper safety wear & gear must be issued to all the workers being registered for the induction (i.e., Shoes/Helmets/Goggles/Leg guard/Apron etc.)
   b. They must arrive fully dressed in safety wear & gear to attend the induction.
   c. Any one failing to conform to this safety wear& gear requirement shall not qualify to attend.

d. On completing attending subcontractor's in-house HSE induction, each employee shall sign an induction training form to declare that he had understood the content and shall abide to follow and comply with safe work practices.
e. They may only then be qualified to be issued with a personal I.D. card, for access to the work site subject to clearing the medical fitness test.




ABOVE STICKER SHALL BE PASTED ON HELMET OF WORKERS AFTER SAFETY INDUCTION TRAINING

## 11.3 JOB-SPECIFIC SKILL BASED HSE TRAINING

The contracting agency shall also impart job specific skill-based safety training to all its employees (Minimum one day) on various related safety topics using internal/external safety professionals/consultants as per the matrix given below. Record of such trainings and attendance particulars shall be maintained in a register for ready reference to statutory authorities/engineer-in charge as per provided format.

**TRAINING MATRIX**

| Name of topic | Executives | Supervisors | Skilled Workmen | Other Workers |
|---|---|---|---|---|
| Safety Induction | Y | Y | Y | Y |
| Accident_ Causes, factors, cost | Y | Y | Y | - |
| Industrial hazards & Accident Prevention | Y | Y | Y | - |
| Investigating, reporting, records | Y | Y | - | - |
| Personal Protective Equipment | - | Y | Y | Y |
| Construction Safety & Role of Supervisory personnel | - | Y | - | - |
| Permit to Work (PTW) | - | Y | Y | y |
| Statutory Provisions (BOCW Act/Rules, Factories Act 1948 etc.) | Y | Y | y | y |
| Material handling | - | y | Y | Y |
| Emergency Management | Y | Y | Y | - |
| Electrical Safety | - | Y | Y | - |
| Fire safety | Y | Y | Y | Y |
| First Aid & CPR (cardio pulmonary resuscitation) | - | Y | Y | Y (Selected) |
| Safety in Welding & Cutting | - | - | Y | - |
| Safety Audit | Y | Y | - | - |
| Safety in Lifting Tools & Tackles | - | Y | Y | y |

| | | | | |
|---|---|---|---|---|
| Safety in Working at height | - | Y | Y | Y |
| Safety in Confined space work | - | Y | Y | Y |
| Defensive Driving | - | Y* | Y* | Y* |

*for construction vehicle operators, helpers & crane operators

Y=YES

**Note:**

i. Subcontractor shall prepare a training plan/ matrix covering all hazards and implement the same after approval of BHEL.
ii. It is to be ensured that every worker undergoes Job-Specific training once every 3 months.
iii. Records of training programmes along with attendance shall be maintained by the subcontractor
iv. Each worker to be issued a Card indicating the types of trainings undergone.

## 11.4 HSE TOOL-BOX TALK:

i. HSE tool Box talk shall be conducted by frontline foreman/supervisor of subcontractor to specific work groups prior to the start of work and shall be randomly attended by subcontractor engineers/ officials. The agenda shall consist of the following:

   a. Details of the job being intended for immediate execution.
   b. The relevant hazards and risks involved in executing the job and their control and mitigating measures.
   c. Specific site condition to be considered while executing the job like high temperature, humidity, unfavorable weather etc.
   d. Recent non-compliances observed.
   e. Appreciation of good work done by any person.
   f. Any doubt clearing session at the end.

ii. Tool box talk to be conducted before start of work in every shift.
iii. During toolbox talk, visual check-up of workers regarding health, any signs of fatigue, intoxication etc. shall be conducted and any suspected workers to be acted upon.
iv. Record of Tool box talk shall be maintained as per provided **format**

## 11.5 TRAINING ON HEIGHT WORK:

i. Training on height work shall be imparted to all workers working at height by in-house/external faculty at least once every 3 months.
ii. For Height Workers Separate pass shall be provided by the subcontractor.
iii. The training shall be of minimum 2-hour duration, through audio-visual medium and followed by evaluation. In case of poor scoring, training shall be repeated.
iv. The training shall include following topics:

   a. Proper use of PPEs – safety harness, lanyard, fall arrester, retractable fall arrester, life line, safety nets etc.
   b. Provision of secondary means of fall protection

c. Safe climbing through monkey ladders.
d. Inspection of PPEs.
e. Medical fitness requirements.
f. Mock drill on rescue at height.
g. Dos & Don'ts during height work.
h. Accident case Studies

## 11.6 Re-Induction Training

The induction training shall be repeated for every worker after at least 1 year and shall be a pre-requisite for renewal of Gate Pass/ ID card.

## 11.7 Penalty Training

The personnel involved in Safety Violations/ Incidents shall mandatorily undertake penalty training pertaining to the violation/ incident. Penalty training shall be at least half-day duration.

## 11.8 HSE Promotion-Signage, Posters, Competition, Awards etc.:

i. HSE Displays shall be installed as indicated in Section A
ii. Contracting agencies shall arrange for display of safety hoardings depicting suitable safety cartoons/messages/ cautionary notices at appropriate places of project site to remind the workers to perform their duties safely.
iii. Apart from safety hoardings, each agency should maintain a safety bulletin board at all their work locations. Such safety bulletin boards should depict the activities being planned for the day, good practices, permit details etc.
iv. Safety suggestion boxes shall be kept at each subcontractor's office at site for obtaining safety suggestions from the workers. Best suggestions should be implemented and may be rewarded suitably to encourage the workers for safety.
v. Safety awareness campaigns, competitions, plays, movie shows, songs etc. to be organized for workers at Site and Labor colony from time to time to enhance Safety Awareness

## 11.9 HSE Rewards & Incentive Scheme

Subcontractor shall implement a reward & incentive scheme for workers & supervisors displaying adherence to safety principles. Such workers shall be felicitated in a monthly function, attended by Subcontractor top management and BHEL representatives. Suitable gift shall be given to such workers for encouragement.

## 11.10 HSE Awareness Program for Officials:

Subcontractor shall arrange monthly HSE awareness program on different topics including medical awareness for all engineers/ supervisors / officials working at site. This program can be part of progress/ safety review meetings.

# 12. HSE COMMUNICATION AND PARTICIPATION:

## 12.1 HSE INCIDENT REPORTING, INVESTIGATION & CORRECTIVE ACTION:

i. All incidents (near misses, property damage, first-aid cases, minor, major and fatal incidents) shall be reported to BHEL as they happen immediately through SMS and Hard/Soft copy as per provided format

ii. All incidents including near miss, minor, major and fatal incidents shall be recorded

iii. All incidents shall be investigated for Root Causes and corrective actions ensured to prevent recurrence shall be implemented.

iv. Work shall be put on hold in the area till corrective actions are verified by BHEL

v. The Root Cause Analyses and Corrective actions taken shall be recorded

## 12.2 HSE EVENT REPORTING:

i. Important HSE events like HSE training, Medical camp etc. organized at site shall be reported to BHEL site management in detail with photographs for publication in different in-house magazines

ii. Celebration of important days like National Safety Day, World Environment Day etc. shall also be reported as mentioned above.

## 12.3 MONTHLY HSE REPORTING:

i. All routine and non-routine HSE activities shall be reported to BHEL on monthly basis by the subcontractor as per provided format. The reporting medium can be hard/soft as per BHEL requirement.

ii. The period of reporting shall be 25th of the preceding month to 24th of the present month and shall be submitted by the end of the calendar month.

iii. Report shall include good quality images of HSE Activities

## 12.4 DAILY HSE ACTIVITY REPORTING:

Daily HSE activities shall be reported by subcontractor to BHEL as per provided format

## 12.5 HSE SUGGESTIONS:

All workers and employees shall be encouraged to provide suggestions for improvement in Health, Safety & Environment performance at site. The suggestions shall be recorded in a “Suggestions Register” as per provided format. Suggestions found suitable for implementation shall be implemented and recognition / reward to be given to the submitter.

Suggestion Register to be placed at Site and Labor Colony and shall be reviewed on periodic basis

## 12.6 CLIENT COMMUNICATION:

All HSE related communication from BHEL, customer / external statutory and regulatory agencies to be handled on priority. Same to be recorded and issues to be resolved in expeditious manner

# 13. SAFETY DURING WORK EXECUTION:

Safety during work execution shall be ensured by following appropriate Safety Rules, providing adequate resources, deploying competent and trained manpower, regular training & inspection and non-conformity resolution. Main aspects are indicated as under:

## 13.1 OPERATIONAL CONTROL PROCEDURES:

In order to reduce the risk associated with hazardous activities, applicable OCPs (Operational control procedures) will be followed by subcontractor as per BHEL instructions, outcomes of Hazard Analysis & other requirements. This will be done as part of normal scope of work. Illustrative list of reference OCPs is given below.

**TABLE 13.1 ILLUSTRATIVE LIST OF REFERENCE OCPS**

| No. | Topic | No. | Topic | No. | Topic |
|---|---|---|---|---|---|
| **0** | General Safety | **22** | Steam blowing | **44** | Material preservation |
| **1** | Handling of chemicals | **23** | Working in confined area | **45** | Electro-resistance heating |
| **2** | Electrical safety | **24** | Operation of passenger lift, material hoists & cages | **46** | Blasting |
| **3** | Energy conservation | **25** | Vehicle/ Crane maintenance | **47** | Transformer charging |
| **4** | Welding and gas cutting operation | **26** | Radiography | **48** | Handling of battery system |
| **5** | Fire safety | **27** | Waste disposal | **49** | DG set |
| **6** | Use of hand tools | **28** | Handling & storage of mineral wool | **50** | Sanitary maintenance |
| **7** | First aid | **29** | Working at night | **51** | Piling rig operation |
| **8** | Food safety at canteen | **30** | Computer operation | **52** | Passivation |
| **9** | Use of cranes | **31** | Storage in open yard | **53** | EDTA Cleaning |
| **10** | Storage and handling of gas cylinders | **32** | Drilling, reaming and grinding(machining) | **54** | Chemical cleaning of Pre boiler system |
| **11** | Manual arc welding | **33** | Stress relieving | **55** | Boiler Light up |
| **12** | Use of helmets | **34** | Hydraulic test | **56** | Rolling and Synchronization |
| **13** | Good house keeping | **35** | Trial run of rotary equipment | **57** | Loading of Unit |

| | | | | | |
|---|---|---|---|---|---|
| **14** | Safe excavation | **36** | Batching | **58** | Air compressor |
| **15** | Working at height | **37** | Cable laying/tray work | **59** | Hydra Operation |
| **16** | Filling of hydrogen in cylinder | **38** | Spray insulation | **60** | Duct Pre-assembly |
| **17** | Illumination | **39** | Compressor operation | **61** | Resumption of construction activities after lockdown and prevention of coronavirus infection during site operations |
| **18** | Handling and erection of heavy metals | **40** | Gas distribution test | | |
| **19** | Acid cleaning | **41** | Cleaning of Hot well / Deaerator | | |
| **20** | Oil flushing | **42** | Electrical maintenance | **61A** | Prevention of Covid-19 infection in labour colony |
| **21** | Alkali boil out | **43** | O&M of control of AC plant & system | **62** | Truss/ Structure fit-up and alignment |

a. The reference OCPs shall be suitably modified by subcontractor as per specific requirements to control the hazards.

b. In case any other OCP is found to be applicable during the execution of work at site, then subcontractor will prepare and follow those as well.

## 13.2 WORK PERMIT SYSTEM:

i. The following activities shall be carried out by the subcontractor strictly after obtaining Permit to Work from BHEL
   a) Height working
   b) Hot working
   c) Confined space Work
   d) Excavation more than 2-meter depth
   e) Radiography
   f) Heavy / Complex / Critical Lifting Activity
   g) Night / Holiday Work
   h) Material Loading / Unloading
   i) Grating, Safety Net, Safety Facility Removal
   j) Live Electrical Maintenance etc. - Lockout / Tagout
   k) Beam / truss/ duct/ structure alignment

ii. The Work Permit Formats shall be provided by BHEL at Site. It is the responsibility of the subcontractor to ensure their availability

iii. The above list is not exhaustive. BHEL reserves right to introduce additional Permits or modify requirements for usage of existing Permits. The conditions for using the Permit are specified in the Format (General Requirements).

iv. Where customer is having separate Work Permit System the same shall be followed in conjunction / merged to ensure all activities and checks are covered in all systems.

v. Details of working Group to be attached along with work permit request.

vi. All the Permits along with JSA/HIRA must be initiated by Agency Execution Team

vii. Permit applicant shall apply for work permit of particular work activity at particular location before starting of the work with Job Hazard Analysis.

viii. All Permit signatories (including subcontractor's package in-charge and HSE Officer) shall physically visit the work area and check that all the safety control measures necessary for the activity are in place. Only then the permit shall be issued.

ix. Signatory shall physically visit the area of work and ensure all required safeguards before signing the Permit

x. Signatory shall periodically visit the area to confirm the availability of required safeguards throughout the currency of the permit

xi. In case any Permit requirement is not available, work will be stopped till it is made available

xii. Permit holder shall implement and maintain all control measures during the period of permit. The permit will be closed after completion of the work.

xiii. Online Work Permit System shall be used whenever provided by BHEL, otherwise hard copy shall be used

## 13.3 Activity-Specific Precautions/ Controls

Detailed HSE precautions for various activities undertaken at Site by the subcontractors are specified in **Annexure I**. Same are to be ensured by the Sub-subcontractor while carrying out respective activities at Site

Index of **Annexure I** is given as under

## 14. ENVIRONMENTAL CONTROL & SOCIAL RESPONSIBILITY

i. Environment protection has always been given prime importance by BHEL. Environmental damage is a major concern of the principal subcontractor and every effort shall be made, to have effective control measures in place to avoid pollution of Air, Water and Land and associated life. Banned substances like asbestos and Chlorofluorocarbons such as carbon tetrachloride and trichloroethylene shall not be used. Waste disposal shall be done in accordance with the guidelines laid down in the project specification.

ii. Any chemical including solvents and paints, required for construction shall be stored in designated bonded areas around the site as per Material Safety Data Sheet (MSDS).

iii. In the event of any spillage, the principle is to recover as much material as possible before it enters drainage system and to take all possible action to prevent spilled materials from running off the site. The subcontractor shall use appropriate MSDS for clean-up technique

iv. All subcontractors shall be responsible for the cleanliness of their own areas

v. Regular dust suppression using sprinklers shall be carried out in respective area

vi. The subcontractors shall ensure that noise levels generated by plant or machinery are as low as reasonably practicable. Where the subcontractor anticipates the generation of excessive noise levels from his operations the subcontractor shall inform to Construction Manager of BHEL accordingly so that reasonable &practicable precautions can be taken to protect other persons who may be affected.

vii. It is imperative on the part of the subcontractor to join and effectively contribute in joint measures such as tree plantation, environment protection, contributing towards social upliftment, conversion of packing woods to school furniture, enhancing good relation with local populace etc.

viii. The subcontractor shall carry out periodic air and water quality check and illumination level checking in his area of work place and take suitable control measure.

## 15. HOUSEKEEPING

i. Keeping the work area and access roads clean/ free from debris, removed scaffoldings, scraps, insulation/sheeting wastage /cut pieces, temporary structures, packing woods etc. will be in the scope of the subcontractor. Such cleanings have to be done by subcontractor within quoted rate, on daily basis.

ii. If such activity is not carried out by subcontractor / BHEL is not satisfied, then BHEL may get it done by other agency and actual cost along with BHEL overheads will be deducted from subcontractor's bill. Such decisions of BHEL shall be binding on the subcontractor

iii. Dedicated Housekeeping gangs shall be deployed, who shall be provided all required PPEs and safety training

iv. Mass housekeeping shall be carried out for half a day in a week

v. Proper housekeeping to be maintained at work place and the following are to be taken care of on daily basis.

vi. All surplus earth and debris are removed/disposed off from the working areas to identified locations.

vii. Unused/Surplus cables, steel items and steel scrap lying scattered at different places/elevation within the working areas are removed to identified locations.

viii. All wooden scrap, empty wooden cable drums and other combustible packing materials, shall be removed from workplace to identified locations.

ix. Sufficient waste bins shall be provided at different work places for easy collection of scrap/waste. Scrap chute shall be installed to remove scrap from high locations.

x. Access and egress (stair case, gangways, ladders etc.) path should be free from all scrap and other hindrances.

xi. Workmen shall be educated through tool box talk about the importance of housekeeping and encourage not to litter.

xii. Labor camp area shall be kept clear and materials like pipes, steel, sand, concrete, chips and bricks, etc. shall not be allowed in the camp to obstruct free movement of men and machineries.

xiii. Fabricated steel structures, pipes & piping materials shall be stacked properly.

xiv. No parking of trucks/trolleys, cranes and trailers etc. shall be allowed in the camp, which may obstruct the traffic movement as well as below LT/HT power line.

xv. Utmost care shall be taken to ensure over all cleanliness and proper upkeep of the working areas.

## 16. WASTE MANAGEMENT

i. Take suitable measures for waste management and environment related laws/legislation as a part of normal construction activities. Compliance with the legal requirements on storage/ disposal of paint drums (including the empty ones), Lubricant containers, Chemical Containers, and transportation and storage of hazardous chemicals will be strictly maintained.

ii. Details of E-Waste, Hazardous Waste, biomedical waste etc. and their disposal plan, shall be submitted to BHEL every 6 months as per provided **formats**.

### 16.1 BINS AT WORK PLACE

i. Sufficient rubbish bins shall be provided close to workplaces.
ii. Bins should be painted yellow and numbered.
iii. Sufficient nos. of drip trays shall be provided to collect oil and grease.
iv. Sufficient qty. of broomsticks with handle shall be provided.
v. Adequate strength of employees should be deployed to ensure daily monitoring and service for waste management.

### 16.2 STORAGE AND COLLECTION

i. Different types of rubbish/waste should be collected and stored separately.
ii. Paper, oily rags, smoking material, flammable, metal pieces should be collected in separate bins with close fitting lids.
iii. Rubbish should not be left or allowed to accumulate on construction and other work places.
iv. Do not burn construction rubbish near working site.

### 16.3 SEGREGATION

i. Earmark the scrap area for different types of waste.
ii. Store wastes away from building.
iii. Oil spill absorbed by non-combustible absorbent should be kept in separate bin.
iv. Clinical and first aid waste stored and incinerated separately.

### 16.4 DISPOSAL

i. Sufficient containers and scrap disposal area should be allocated.
ii. All scrap bin and containers should be conveniently located.
iii. Provide self-closing containers for flammable/spontaneously combustible material.
iv. Keep drainage channels free from choking.
v. Make schedule for collection and disposal of waste.

### 16.5 WARNING AND SIGNS

i. Appropriate sign to be displayed at scrap storage area
ii. No toxic, corrosive or flammable substance to be discarded into public sewage system.
iii. Waste disposal shall be in accordance with best practice.
iv. Comply with all the requirements of Pollution Control Board (PCB) for storage and disposal of hazardous waste.

## 17. TRAFFIC MANAGEMENT SYSTEM

### 17.1 SAFE WORKPLACE TRANSPORT SYSTEM

i. Traffic routes in a work place shall be suitable for the persons or vehicles using them. This shall be sufficient in number and of sufficient size. This shall reflect the suitability of traffic routes for vehicles and pedestrians.

ii. Where vehicles and pedestrians use the same traffic routes there shall be sufficient space between them. Where necessary all traffic routes must be suitably indicated. Pedestrians or vehicles must be able to use traffic routes without endangering those at work. There must be sufficient separation of traffic routes from doors, gates and pedestrian traffic routes.

iii. For internal traffic, lines marked on roads / access routes and between buildings shall clearly indicate where vehicles are to pass.

iv. Temporary obstacles shall be brought to the attention of drivers by warning signs or hazard cones.

v. Speed limits shall be clearly displayed for each kind of vehicle.

vi. Speed ramps preceded by a warning signs or marker are necessary.

vii. The traffic route should be wide enough to allow vehicles to pass and re-pass oncoming or parked traffic and it may be advisable to introduce on-way system or parking restrictions.

viii. Safest route shall be provided between places where vehicles have to call or deliver.

ix. Avoid vulnerable areas/items such as fuel or chemicals tanks or pipes, open or unprotected edges and structures likely to collapse

x. Safe areas shall be provided for loading and unloading.

xi. Avoid sharp or blind bends. If this is not possible hazards should be indicated e.g. blind corner.

xii. Ensure road crossings are minimum and clearly signed.

xiii. Entrance and gateways shall be wide enough to accommodate a second vehicle without causing obstruction.

xiv. Set sensible speed limits which are clearly sign posted.

xv. Where necessary ramps should be used to retard speed. This shall be preceded by a warning sign or mark on the road.

xvi. Forklift trucks shall not pass over road hump unless of a type capable of doing so.

xvii. Overhead electric cable, pipes containing flammable hazardous chemical shall be shielded by using goal posts height gauge posts or barriers.

xviii. Road traffic signs shall be provided on prominent locations for prevention of incidents and hazards and for quick guidance and warning to employees and public. Safety signs shall be displayed as per the project working requirement and guideline of the state in which project is done. Vehicles hired or used shall not be parked within the 15m radius of any working area. Any vehicle, that is required to be at the immediate/near the vicinity, shall be approved by the person in-charge of the site.

## 17.2 Traffic Route For Pedestrians

i. Where traffic routes are used by both pedestrians and vehicles road shall be wide enough to allow vehicles and pedestrians safely.

ii. Separate routes shall be provided for pedestrians to keep them away from vehicles. Provide suitable barriers/guard at entrances/exit and the corners or buildings.

iii. Where pedestrian and vehicle routes cross, appropriate crossing shall be provided.

iv. Where crowd is likely to use roadway e.g. at the end of shift, stop vehicles from using them at such times.
v. Provide high visibility clothing for people permitted in delivery area.

## 17.3 WORK VEHICLE

Work vehicle shall be as safe stable efficient and roadworthy as private vehicles on public roads. Site management shall ensure that drivers are suitably trained. All vehicle e.g. heavy motor vehicle forklift trucks dump trucks mobile cranes shall ensure that the work equipment conforms to the following:

i. A high level of stability.
ii. A safe means of access/egress.
iii. Suitable and effective service and parking brakes.
iv. Windscreens with wipers and external mirrors giving optimum all round visibility.
v. Provision of horn, vehicle lights, reflectors, reversing lights, reversing alarms.
vi. Provision of seat belts.
vii. Guards on dangerous parts.
viii. Driver protection - to prevent injury from overturning and from falling objects/materials.
ix. Driver protection from adverse weather.
x. No vehicle shall be parked below HT/LT power lines.
xi. Valid Pollution Under Control certification for all vehicles
xii. Wheel stopper shall be use during the parking of vehicle
xiii. Helper to be deployed in each vehicle as per site requirement.

## 17.4 DAILY CHECK BY DRIVER

1. There should also be daily safety checks containing below mentioned points by the driver before the vehicle is used.

| | | |
|---|---|---|
| Brakes | Mirrors | Warning signals |
| Tires | Windscreen waters | Specific safety systems i.e. controls & interlocks |
| Steering | Wipers | |

2. Management should ensure that drivers carry out these checks.

## 17.5 TRANSPORTATION OF PERSONNEL AND MATERIALS BY VEHICLES

i. All drivers shall hold a valid driving License for the class of vehicle to be driven and be registered as an authorized BHEL driver with the Administration Department.
ii. Securing of the load shall be by established and approved methods, i.e. chains with patented tightening equipment for steel/heavy loads. Sharp corners on loads shall be avoided when employing ropes for securing.
iii. All overhangs shall be made clearly visible and restricted to acceptable limits
iv. Load shall be checked before moving off and after traveling a suitable distance.
v. On no account is construction site to be blocked by parked vehicles Drivers of vehicles shall only stop or park in the areas designate by the stringing foreman.

vi. Warning signs shall be displayed during transportation of material.
vii. All vehicles used by BHEL shall be in worthy condition and in conformance to the Land Transport requirement.
viii. Wheel stopper shall be use during the parking of vehicle
ix. Helper to be deployed in each vehicle as per site requirement.

### 17.6 MAINTENANCE

All Vehicles used for transportation of man and material shall undergo scheduled inspections on frequent intervals to secure safe operation. Such inspections shall be conducted in particular for steering, brakes, lights, horn, doors etc. Site management shall ensure that work equipment is maintained in an efficient, working order and in good repair. Inspections and services carried out at regular intervals of time and or mileage. No maintenance shall be carried below HT/LT power lines.

## 18. EMERGENCY PREPAREDNESS AND RESPONSE

i. Emergency preparedness and response capability of site shall be developed as per Emergency Preparedness and Response plan issued by BHEL
ii. Availability of adequate number of first aiders and fire warden shall be ensured with BHEL and its subcontractors
iii. All the subcontractor's supervisory personnel and sufficient number of workers shall be trained for fire protection systems. Enough number of such trained personnel must be available during the tenure of contract. Subcontractor should nominate his supervisor to coordinate and implement the safety measures.
iv. Assembly point shall be earmarked and access to the same from different location shall be shown
v. Fire exit shall be identified and pathway shall be clear for emergency escape.
vi. Appropriate type and number of fire extinguisher shall be deployed as per Fire extinguisher deployment plan and validity shall be ensured periodically through inspection
vii. Adequate number of first aid boxes shall be strategically placed at different work places to cater emergency need. Holder of the first aid box shall be identified on the box itself who will have the responsibility to maintain the same.
viii. First aid center shall be developed at site with trained medical personnel and ambulance
ix. Emergency contact numbers (format given in EPRP) of the site shall be displayed at prominent locations.
x. Tie up with fire brigade shall be done in case customer is not having fire station.
xi. Tie up with hospital shall be done in case customer is not having hospital.
xii. Disaster Management group shall be formed at site
xiii. Mock drill shall be arranged at regular intervals. Monthly report of the above to be given to BHEL HSE Officer as per prescribed BHEL formats
xiv. Mock drill shall be conducted on different emergencies periodically to find out gaps in emergency preparedness and taking necessary corrective action

# 19. HSE INSPECTION

Inspection on HSE for different activities being carried out at site shall be done to ensure compliance to HSE requirements. The subcontractor shall maintain and ensure necessary safety measures as required for inspection and tests HV test, Pneumatic test, Hydraulic test, Spring test, Bend test as applicable, to enable inspection agency for performing Inspection. If any test equipment is found not complying with proper safety requirements then the Inspection Agency may withhold inspection, till such time the desired safety requirements are met.

Online/ App-based HSE Inspection system shall be used for inspection whenever provided by BHEL otherwise Hard-copy based system shall continue

| | ☐ OK | ☐ NOT OK |
|---|---|---|
| Contractor Name: | | |
| Equipment Identification No : | | |
| Inspection Date : | | |
| Next Inspection Date : | | |
| Inspected By : | | |

**Every Inspected Equipment shall display above sticker**

## 19.1 INSPECTION PLAN

Subcontractor shall prepare an inspection plan covering all areas/ activities/ equipment/ hazards and implement the same after getting approval of BHEL. Responsibility to ensure coverage of all areas/ activities rests with the subcontractor.

All Inspections shall be witnessed by BHEL – only then they shall be considered as valid

## 19.2 INSPECTION REPORTS

Monthly inspection reports as per plan shall be submitted to BHEL HSE Head

## 19.3 NON-CONFORMANCES

Any non-conformances identified during inspection observed shall be addressed on priority.

The responsibility of resolution shall rest with the Subcontractor Site In-charge

In case immediate closure of non-conformities is not possible:

a. work to be halted in the area
b. non-conformance to be generated and submitted to responsible person and BHEL
c. non-conformance to be resolved through responsible agency / person

Only after closure of non-conformances, work to be allowed to resume

## 19.4 DAILY HSE CHECKS

Both the Site Supervisors and HSE Officer of Subcontractor are to conduct daily site Safety inspection around work activities and premises to ensure that work methods and the sites

are maintained to an acceptable standard. The following are to form the common subjects of a daily safety inspection:

i. Personal Safety wears & gear compliance.
ii. Complying with site safety rules and permit-to-work (PTW).
iii. Positions and postures of workers.
iv. Use of tools and equipment etc. by the workers.

The inspection should be carried out just when work starts in beginning of the day, during peak activities period of the day and just before the day's work ends.

## 19.5 Indicative List of Inspections And Periodicities

Indicative list & periodicity of Inspections is given as under. It is the responsibility of the subcontractor to develop an inspection plan covering all areas & activities in the scope.

| SL. No. | Format Name | Frequency of check (if applicable) |
|---|---|---|
| 01 | Inspection of First Aid Box | Weekly |
| 02 | Inspection of PPE | Weekly |
| 03 | Inspection of T&Ps | Monthly |
| 04 | Inspection of Cranes | Monthly |
| 05 | Inspection of Winches | Monthly |
| 06 | Inspection on Height Working | Weekly |
| 07 | Inspection on Welding & Gas Cutting | Monthly |
| 08 | Inspection on Electrical Installation | Monthly |
| 09 | Inspection on Elevator | Weekly |
| 10 | Inspection of Excavation | Weekly |
| 11 | Inspection of Labor Colony | Monthly |
| 12 | Inspection of Illumination Levels | Weekly |

The checklists shall be provided by BHEL at Site. It is the responsibility of the subcontractor to ensure their availability before start of work

### 19.5.1 Inspection Of PPE

i. PPEs shall be inspected by HSE officer at random once in a week as per provided **format** for its compliance to standard and compliance to use and any adverse observation shall be recorded in the PPE register.
ii. The applicable PPEs for carrying out particular activities are listed below.

### 19.5.2 Inspection Of Tools & Plants (T&Ps)

i. A master list of T&Ps shall be maintained by each subcontractor in provided **format**.
ii. All T&Ps being used at site shall be inspected by HSE officer once in a month as per provided **format** for its healthiness and maintenance.
iii. The T&Ps which require third party inspection shall be checked for its validity during inspection. The third-party test certificate should be accompanied with a copy of the concerned competent person's valid qualification record.

iv. BHEL shall be given advance intimation of Third-Party Inspection. BHEL shall associate with Inspection as per discretion.
v. The validity of T&P shall be monitored as per provided **format**

### 19.5.3 Inspection Of Cranes And Winches

i. Cranes and winches shall be inspected by the operator through a daily checklist for its safe condition (as provided by the equipment manufacturer) before first use of the day.
ii. Cranes and Winches shall be inspected by HSE officer once in a month as per provided **format** for healthiness, maintenance and validity of third-party inspection.
iii. The date of third-party inspection and next due date shall be painted on cranes and winches.
iv. The operators/drivers shall be authorized by sub-subcontractor based on their competency and experience and shall carry the I-card.
v. The operator should be above 18 years of age and should be in possession of driving license of HMV man & goods), vision test certificate and should have minimum qualification so that he can read the instructions and check list.

### 19.5.4 Inspection Of Height Working

i. Any activity carried out at more than 2 m height is classified as height work.
ii. Inspection of height working shall be conducted daily by Supervisors before start of work to ensure safe working condition including provision of
   a. Fall arrestor
   b. Lifelines – connected to rigid & independent structure
   c. Safety nets deployed below all height work activities
   d. Fencing and barricading
   e. Warning signage
   f. Covering of opening
   g. Proper scaffolding with access and egress.
   h. Illumination
iii. For full duration of height work, constant supervision to be maintained by dedicated HSE personnel
iv. Inspection on height working shall be conducted once in a week by HSE officer as per provided **format**.
v. Medical fitness of height worker shall be ensured.
vi. Height working shall not be allowed during adverse weather.

### 19.5.5 Inspection Of Welding And Gas Cutting Operation

i. Supervisor shall ensure that no flammable items are available in near vicinity during welding and gas cutting activity.
ii. Gas cylinders shall be kept upright.
iii. Use of Flash back arrestor shall be ensured at both ends.

iv. Inspection during welding and gas cutting operations shall be carried out by HSE officer once a month as per provided **format**.
v. Use of fire blanket to be ensured to avoid falling of splatters during welding or gas cutting operation at height.
vi. Availability of fire extinguisher at vicinity shall be ensured.

### 19.5.6 Inspection Of Electrical Installation / Appliances

i. Ensure proper earthing in electrical installation
ii. Use ELCB at electrical booth
iii. Electrical installation shall be properly covered at top where required
iv. Use appropriate PPEs while working
v. Use portable electrical light < 24 V in confined space and potentially wet area.
vi. Inspection shall be carried out as per provided **format**.

### 19.5.7 Inspection Of Elevator

i. Elevators shall be inspected by concerned supervisors once in a week as per provided **format**
ii. All elevators shall be inspected by competent person and validity shall be ensured.
iii. The date of third-party inspection and next due date shall be painted on elevator.

### 19.5.8 Inspection Of Excavation

Excavation activities shall be inspected as per provided **format**

### 19.5.9 Internal/ External HSE Audits/Inspections

i. All non-conformities and observations on HSE identified during internal or external HSE audit shall be disposed of by site in a time bound manner and reported back the implementation status.
ii. Corrective action and Preventive action on HSE issues raised by certification body issued by BHEL shall be implemented by site and reported to Site management.

## 20. Terms and Definitions:

1. **Incident**
   Work- related or natural event(s) in which an injury, or ill health (regardless of severity), damage to property or fatality occurred, or could have occurred.

2. **Near Miss:**
   An incident where no ill health, injury, damage or other loss occurs, but it had a potential to cause, is referred to as “Near-Miss”.

3. **Man-Hours Worked:**
   The total number of man hours worked by all employees including subcontractors working in the premises. It includes managerial, supervisory, professional, technical, clerical and other workers including contract labors. Man-hours worked shall be calculated from the payroll or time clock recorded including overtime. When this is not feasible, the same shall be estimated by multiplying the total man-days worked for the

period covered by the number of hours worked per day. The total number of workdays for a period is the sum of the number of men at work on each day of period. If the daily hours vary from department to department separate estimate shall be made for each department and the result added together.

4. **First Aid Cases:**
   First aids are not essentially all reportable cases, where the injured person is given medical treatment and discharged immediately for reporting on duty, without counting any lost time.

5. **Lost Time Injury:**
   Any work injury which renders the injured person unable to perform his regular job or an alternative restricted work assignment on the next scheduled work day after the day on which the injury occurred.

6. **Medical Cases:**
   Medical cases come under non-reportable cases, where owing to illness or other reason the employee was absent from work and seeks Medical treatment.

7. **Type of Incidents & Their Reporting:**
   The three categories of Incident are as follows:

8. **Non-Reportable Cases:**
   An incident, where the injured person is given medical help and discharged for work without counting any lost time.

9. **Reportable Cases:**
   In this case the injured person is disable for 48 hours or more and is not able to perform his duty.

10. **Injury Cases:**
    These are covered under the heading of non-reportable cases. In these cases, the incident caused injury to the person, but he still continues his duty.

11. **Total Reportable Frequency Rate**
    Frequency rate is the number of Reportable Lost Time Injury (LTI) per one Million Man hours worked. Mathematically, the formula read as:

    Number of Reportable LTI x 1,000,000/ Total Man Hours Worked

12. **Severity Rate:**
    Severity rate is the Number of days lost due to Lost Time Injury (LTI) per one Million Man hours worked. Mathematically, the formula reads as:
    Days lost due to LTI x 1,000,000/ Total Man Hours Worked

13. **Incidence Rate:**
    Incidence Rate is the Number of LTI per one thousand manpower deployed. Mathematically, the formula reads as:
    Number of LTIx1000/Average number of manpower deployed

**14. HIRA:**

Hazard Identification and Risk Assessment (HIRA) is a process of identifying Hazards in work area and then assessing them properly

**15. Method Statement:**

A method statement is prepared by the Execution/ Engineering Department detailing the steps, equipment, competencies and safety precautions required for carrying out any activity

**16. Job Safety Analysis:**

A job safety analysis (JSA) is a procedure which helps integrate accepted safety and health principles and practices into a particular task or job operation. In a JSA, each basic step of the job is to identify potential hazards and to recommend the safest way to do the job. Other terms used to describe this procedure are job hazard analysis (JHA) and job hazard breakdown.

**17. Safety Walk:**

It's conducted periodically by an official - it's a walk through a portion or whole of a site as a HSE officer who notes down HSE observations, speak to concerned workmen and supervisor on observation, get the same corrected with personal follow up- this sends out a strong message on Management's commitment to safety.

**18. Heavy & Complex Lifting:**

A heavy and complex lifting activity includes:

1. Lifting above 20 Tons
2. Tandem Lifting using multiple cranes
   Total load exceeding 75% of capacity of crane. Depending up the condition of cranes, hydra cranes, winch machines & other lifting accessories
3. Lift of unusual difficulty or geometry or rigging
4. Lift over operating units
5. Any other lift as decided by site HSE / Erection

**19. Safety Committee:**

As per the BOCW, Safety Committee shall be constituted if there are more than five hundred or more construction workers are employed at any site. As per the Factories Act, 1948 it is for 250 workers. It shall be represented by equal number of representatives of employer and construction workers.

**20. Night Work:**

Work conducted after sunset when only a fraction of total manpower is available

# ANNEXURES

# ANNEXURE A

Medical Centre & Ambulance

# A. Medical Centre

1. Paramedical staff
    a. When < 500 workers, 1 Trained Male Nurse (round the clock deployment)
    b. When >=500 workers*:
        i. Registered Medical Practitioner (Qualified MBBS) to be deployed for at least 8 hours in a day, 5 days per week
        ii. 2 Trained Male Nurses (round the clock deployment)
2. All articles as per Schedule IV of BOCW Central Rules, 1998 to be made available in the Medical Centre (given under for convenience)
3. Basic Facilities/ Requirements to be provided as per location eg. Refrigerator, Air Conditioner, Anti Venom Serums etc.
4. Tie-ups with speciality hospitals to be ensured for referring serious patients

* In case the number of workers is envisaged to exceed 500, a medical practitioner is to be engaged.

**SCHEDULE IV (BOCW CENTRAL RULES, 1998) ARTICLES FOR AMBULANCE ROOM**
**[SEE RULE 226 (C)]**

i. A glazed sink with hot and cold water always available.
ii. A table with a smooth top at least 180 cm x 105 cm.
iii. Means for sterilising instruments.
iv. A couch.
v. Two stretchers.
vi. Two buckets or containers with close fitting lids.
vii. Two rubber hot water bags
viii. A kettle and spirit stove or other suitable means of boiling water.
ix. Twelve plain wooden splints 900 cm x 100 cm x 6 cm.
x. Twelve plain wooden splints 350 cm x 75 cm x 6 cm.
xi. Six plain wooden splints 250 cm x 50 cm x 12 cm.
xii. Six woollen blankets.
xiii. Three pairs of artery forceps.
xiv. One bottle of spiritus annemia aremations (120 ml).
xv. Smelling salt (60 gm).
xvi. Two medium size sponges.
xvii. Six hand towels.
xviii. Four kidney trays.
xix. Four cakes of toilet, preferably antiseptic soap.
xx. Two glass tumblers and tow wine glasses.
xxi. Two clinical thermometers.
xxii. Two tea spoons.
xxiii. Two graduated (120 ml) measuring glasses.
xxiv. Two minimum measuring glasses.
xxv. One wash bottle (1000 cc) for washing eyes.
xxvi. one bottle (one litre) carbolic lotion 1 to 20.
xxvii. Three chairs.
xxviii. One screen.
xxix. One electric hand torch.
xxx. Four first-aid boxes or cupboards stocked to the standards prescribed in
xxxi. An adequate supply of tetanus toxide.
xxxii. Injections—morphia, pethidine, atrophine, adrenaline, coramine, novocaine (6 each).
xxxiii. Cramine liquid (60 ml).
xxxiv. Tablets—antihistaminic antispasmodic (25 each).
xxxv. Syringes with needles—2 cc, 5 cc, 10 cc and 500 cc.

xxxvi. Three surgical scissors.
xxxvii. Two needle holders, big and small.
xxxviii. Suturing needles and materials.
xxxix. Three dissecting forceps
xl. Three dressing forceps
xli. Three scalpels.
xlii. One stethoscope and a B. P. apparatus.
xliii. Rubber bandage—pressure bandage.
xliv. Oxygen cylinder with necessary attachments.
xlv. Atropine eye ointments.
xlvi. I. V. Fluids and sets 10 nos.
xlvii. Suitable, foot operated, covered, refuse containers.
xlviii. Adequate number of sterilised, paired, latex hand gloves.

## B. Ambulance

1. When number of workers is <500:
   If the distance to a major hospital capable of handling critical injuries expected at Site is <= 50 KM from Site, then 1 BLS (Basic Life Support)/ Type B Ambulance otherwise ALS* (Advanced Life Support)/ Type D Ambulance
2. If no. of workers increases to >2000 workers one additional BLS Ambulance to be deployed
3. Minimum Articles as per Schedule V of BOCW Central Rules to be ensured in each Ambulance. (given under for convenience)

*Final call to be taken at Site in consultation with all the contractors

**SCHEDULE V (BOCW CENTRAL RULES, 1998)**
**CONTENTS OF AMBULANCE VAN OR CARRIAGE**
**[SEE RULE 227]**

The Ambulance Van shall have equipment prescribed as under:

a) General—a portable stretcher with folding and adjusting devices with the Head of the stretcher capable of being tilted upward. Fixed suction unit with equipment. Fixed oxygen supply with equipment. Pillow with case, sheets, blankets, towels, emergency bag, bed pan, urinal glass.
b) Safety Equipment-Flaros with life of three thousand minutes, floor lights, flash lights, fire extinguishers (dry power type), insulated guntlets.
c) Emergency Care Equipment—
   i. **Resuscitation**—Portable suction unit, portable oxygen unit, bag valve mask, hand operated artificial ventilation unit, airways, mouth gag tracheostomy adapters, short spine board, I.V. FLUIDS with administration unit, B. P. manometer cuff stethoscope.
   ii. **Immobilisation**—Long and short padded boards, wire ladder splints, triangular bandage—long and short spine boards.
   iii. **Dressing**-Gauze pads—100 m x 100 mm universal dressing 250 x 1000 mm, roll of aluminium foils—soft roller bandages 150 mm x 5 mm yards adhesive tape in 75 mm roll safety pins, bandage sheets, burn sheets.
   iv. **Poisoning**—Syrup of Ipecac, activated charcoal pre packeted dose, snake bit kit, drinking water.
   v. **Emergency Medicines**—As per requirement (under the advice of construction Medical Officer).

# ANNEXURE A.1

Sample calculation for deduction of operational cost of facilities

**Annexure A.1**

## Cost Calculation Methodology of Operation of Facilities (Data is indicative only)

**(Period of 48 months is considered - shall be on actual basis)**

### A. Project Info:

| | |
|---|---|
| Total time of Project | 48 months |
| Project cost | 1000 Crore |
| No. of packages | 10 (A1-A10) |

### B. Item-wise Calculation:

| Item | Nos. | Rate | Unit | Amount |
|---|---|---|---|---|
| | | | | |
| Ambulance with Driver | 2 | | Monthly/Unit | 170000 |
| Nurse/First aider | 2 X 2 shifts | 15000 | Per month | 30000 |
| Training center one time cost | 1 | 100000 | Once | 100000 |
| Medical center one time cost | 1 | 200000 | Once | 200000 |
| Medicines at medical center | 1 | 10000 | Monthly | 10000 |
| Dust supression water tank | 2 | 2000 | Monthly | 4000 |
| Doctor | 1 | 70000 | Monthly | 70000 |
| Cleaning staff | 1 | 12000 | Monthly | 12000 |
| | | | Recurring monthly expenditure | 296000 |
| | | | Total one-time expenditure | 300000 |

### C. Package-wise Deduction Plan for a period of 48 months

| **Period (In Months)** | 6 | 36 | 6 |
|---|---|---|---|
| | For 1-6 months | For 7-42 months | For 43-48 months |
| **Cost to be incurred from contractors** | 7% | 81% | 12% |
| | 1.17% per month | 2.25% per month | 2.00% per month |

## D. Calculation For One-Time Running Cost

| Packages/ Contracts | A1 | A2 | A3 | A4 | A5 | A6 | A7 | A8 | A9 | A10 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Contract Values (in Thousands) | 100000 | 250000 | 2000000 | 200000 | 500000 | 1500000 | 1000000 | 1000000 | 250000 | 200000 | 7000000 | | |
| Share of common facilities one time running cost (in Thousands) | 4 | 11 | 86 | 9 | 21 | 64 | 43 | 43 | 11 | 9 | Individual Pkg value X Total one time running cost / All Pkg award values | | |
| Timeline of work | 1-6 | 1-8 | 2-48 | 6-36 | 7-15 | 10-48 | 6-48 | 7-40 | 40-48 | 41-48 | | | |
| Month Count of work | 6 | 8 | 47 | 31 | 9 | 39 | 43 | 34 | 9 | 8 | | | |
| Deduction per month (in Thousands) | 1 | 1 | 2 | 0 | 2 | 2 | 1 | 1 | 1 | 1 | Total of One time Running cost (in thousands) | % deduction share of one time running cost per month | Nos. of active packages in month |
| Month No. | | | | | | | | | | | | | |
| 1 | 1 | 1 | | | | | | | | | 2 | 1% | 2 |
| 2 | 1 | 1 | 2 | | | | | | | | 4 | 1% | 3 |
| 3 | 1 | 1 | 2 | | | | | | | | 4 | 1% | 3 |
| 4 | 1 | 1 | 2 | | | | | | | | 4 | 1% | 3 |
| 5 | 1 | 1 | 2 | | | | | | | | 4 | 1% | 3 |
| 6 | 1 | 1 | 2 | 0 | | | 1 | | | | 5 | 2% | 5 |
| 7 | | 1 | 2 | 0 | 2 | | 1 | 1 | | | 8 | 3% | 6 |
| 8 | | 1 | 2 | 0 | 2 | | 1 | 1 | | | 8 | 3% | 6 |
| 9 | | | 2 | 0 | 2 | | 1 | 1 | | | 7 | 2% | 5 |
| 10 | | | 2 | 0 | 2 | 2 | 1 | 1 | | | 8 | 3% | 6 |
| 11 | | | 2 | 0 | 2 | 2 | 1 | 1 | | | 8 | 3% | 6 |
| 12 | | | 2 | 0 | 2 | 2 | 1 | 1 | | | 8 | 3% | 6 |
| 13 | | | 2 | 0 | 2 | 2 | 1 | 1 | | | 8 | 3% | 6 |
| 14 | | | 2 | 0 | 2 | 2 | 1 | 1 | | | 8 | 3% | 6 |
| 15 | | | 2 | 0 | 2 | 2 | 1 | 1 | | | 8 | 3% | 6 |
| 16 | | | 2 | 0 | | 2 | 1 | 1 | | | 6 | 2% | 5 |
| 17 | | | 2 | 0 | | 2 | 1 | 1 | | | 6 | 2% | 5 |
| 18 | | | 2 | 0 | | 2 | 1 | 1 | | | 6 | 2% | 5 |
| 19 | | | 2 | 0 | | 2 | 1 | 1 | | | 6 | 2% | 5 |
| 20 | | | 2 | 0 | | 2 | 1 | 1 | | | 6 | 2% | 5 |
| 21 | | | 2 | 0 | | 2 | 1 | 1 | | | 6 | 2% | 5 |
| 22 | | | 2 | 0 | | 2 | 1 | 1 | | | 6 | 2% | 5 |
| 23 | | | 2 | 0 | | 2 | 1 | 1 | | | 6 | 2% | 5 |
| 24 | | | 2 | 0 | | 2 | 1 | 1 | | | 6 | 2% | 5 |
| 25 | | | 2 | 0 | | 2 | 1 | 1 | | | 6 | 2% | 5 |
| 26 | | | 2 | 0 | | 2 | 1 | 1 | | | 6 | 2% | 5 |
| 27 | | | 2 | 0 | | 2 | 1 | 1 | | | 6 | 2% | 5 |
| 28 | | | 2 | 0 | | 2 | 1 | 1 | | | 6 | 2% | 5 |
| 29 | | | 2 | 0 | | 2 | 1 | 1 | | | 6 | 2% | 5 |
| 30 | | | 2 | 0 | | 2 | 1 | 1 | | | 6 | 2% | 5 |
| 31 | | | 2 | 0 | | 2 | 1 | 1 | | | 6 | 2% | 5 |
| 32 | | | 2 | 0 | | 2 | 1 | 1 | | | 6 | 2% | 5 |
| 33 | | | 2 | 0 | | 2 | 1 | 1 | | | 6 | 2% | 5 |
| 34 | | | 2 | 0 | | 2 | 1 | 1 | | | 6 | 2% | 5 |
| 35 | | | 2 | 0 | | 2 | 1 | 1 | | | 6 | 2% | 5 |
| 36 | | | 2 | 0 | | 2 | 1 | 1 | | | 6 | 2% | 5 |
| 37 | | | 2 | | | 2 | 1 | 1 | | | 6 | 2% | 4 |
| 38 | | | 2 | | | 2 | 1 | 1 | | | 6 | 2% | 4 |
| 39 | | | 2 | | | 2 | 1 | 1 | | | 6 | 2% | 4 |
| 40 | | | 2 | | | 2 | 1 | 1 | 1 | | 7 | 2% | 5 |
| 41 | | | 2 | | | 2 | 1 | | 1 | 1 | 7 | 2% | 5 |
| 42 | | | 2 | | | 2 | 1 | | 1 | 1 | 7 | 2% | 5 |
| 43 | | | 2 | | | 2 | 1 | | 1 | 1 | 7 | 2% | 5 |
| 44 | | | 2 | | | 2 | 1 | | 1 | 1 | 7 | 2% | 5 |
| 45 | | | 2 | | | 2 | 1 | | 1 | 1 | 7 | 2% | 5 |
| 46 | | | 2 | | | 2 | 1 | | 1 | 1 | 7 | 2% | 5 |
| 47 | | | 2 | | | 2 | 1 | | 1 | 1 | 7 | 2% | 5 |
| 48 | | | 2 | | | 2 | 1 | | 1 | 1 | 7 | 2% | 5 |
| Total | 4 | 11 | 86 | 9 | 21 | 64 | 43 | 43 | 11 | 9 | 300 | 100% | |

## D. Calculation For Recurring Running Cost

| Packages/ Contracts | A1 | A2 | A3 | A4 | A5 | A6 | A7 | A8 | A9 | A10 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Contract Values (in Thousands) | 100000 | 250000 | 2000000 | 200000 | 500000 | 1500000 | 1000000 | 1000000 | 250000 | 200000 | 7000000 | |
| Timeline of work | 1-6 | 1-8 | 2-48 | 6-36 | 7-15 | 10-48 | 6-48 | 7-40 | 40-48 | 41-48 | Total of Recurring cost (in thousands) | Nos. of active packages in month |
| | 6 | 8 | 47 | 31 | 9 | 39 | 43 | 34 | 9 | 8 | | |
| Month No. | | | | | | | | | | | | |
| 1 | 85 | 211 | | | | | | | | | 296 | 2 |
| 2 | 13 | 31 | 252 | | | | | | | | 296 | 3 |
| 3 | 13 | 31 | 252 | | | | | | | | 296 | 3 |
| 4 | 13 | 31 | 252 | | | | | | | | 296 | 3 |
| 5 | 13 | 31 | 252 | | | | | | | | 296 | 3 |
| 6 | 8 | 21 | 167 | 17 | | | 83 | | | | 296 | 5 |
| 7 | | 15 | 120 | 12 | 30 | | 60 | 60 | | | 296 | 6 |
| 8 | | 15 | 120 | 12 | 30 | | 60 | 60 | | | 296 | 6 |
| 9 | | | 126 | 13 | 31 | | 63 | 63 | | | 296 | 5 |
| 10 | | | 95 | 10 | 24 | 72 | 48 | 48 | | | 296 | 6 |
| 11 | | | 95 | 10 | 24 | 72 | 48 | 48 | | | 296 | 6 |
| 12 | | | 95 | 10 | 24 | 72 | 48 | 48 | | | 296 | 6 |
| 13 | | | 95 | 10 | 24 | 72 | 48 | 48 | | | 296 | 6 |
| 14 | | | 95 | 10 | 24 | 72 | 48 | 48 | | | 296 | 6 |
| 15 | | | 95 | 10 | 24 | 72 | 48 | 48 | | | 296 | 6 |
| 16 | | | 104 | 10 | | 78 | 52 | 52 | | | 296 | 5 |
| 17 | | | 104 | 10 | | 78 | 52 | 52 | | | 296 | 5 |
| 18 | | | 104 | 10 | | 78 | 52 | 52 | | | 296 | 5 |
| 19 | | | 104 | 10 | | 78 | 52 | 52 | | | 296 | 5 |
| 20 | | | 104 | 10 | | 78 | 52 | 52 | | | 296 | 5 |
| 21 | | | 104 | 10 | | 78 | 52 | 52 | | | 296 | 5 |
| 22 | | | 104 | 10 | | 78 | 52 | 52 | | | 296 | 5 |
| 23 | | | 104 | 10 | | 78 | 52 | 52 | | | 296 | 5 |
| 24 | | | 104 | 10 | | 78 | 52 | 52 | | | 296 | 5 |
| 25 | | | 104 | 10 | | 78 | 52 | 52 | | | 296 | 5 |
| 26 | | | 104 | 10 | | 78 | 52 | 52 | | | 296 | 5 |
| 27 | | | 104 | 10 | | 78 | 52 | 52 | | | 296 | 5 |
| 28 | | | 104 | 10 | | 78 | 52 | 52 | | | 296 | 5 |
| 29 | | | 104 | 10 | | 78 | 52 | 52 | | | 296 | 5 |
| 30 | | | 104 | 10 | | 78 | 52 | 52 | | | 296 | 5 |
| 31 | | | 104 | 10 | | 78 | 52 | 52 | | | 296 | 5 |
| 32 | | | 104 | 10 | | 78 | 52 | 52 | | | 296 | 5 |
| 33 | | | 104 | 10 | | 78 | 52 | 52 | | | 296 | 5 |
| 34 | | | 104 | 10 | | 78 | 52 | 52 | | | 296 | 5 |
| 35 | | | 104 | 10 | | 78 | 52 | 52 | | | 296 | 5 |
| 36 | | | 104 | 10 | | 78 | 52 | 52 | | | 296 | 5 |
| 37 | | | 108 | | | 81 | 54 | 54 | | | 296 | 4 |
| 38 | | | 108 | | | 81 | 54 | 54 | | | 296 | 4 |
| 39 | | | 108 | | | 81 | 54 | 54 | | | 296 | 4 |
| 40 | | | 103 | | | 77 | 51 | 51 | 13 | | 296 | 5 |
| 41 | | | 120 | | | 90 | 60 | | 15 | 12 | 296 | 5 |
| 42 | | | 120 | | | 90 | 60 | | 15 | 12 | 296 | 5 |
| 43 | | | 120 | | | 90 | 60 | | 15 | 12 | 296 | 5 |
| 44 | | | 120 | | | 90 | 60 | | 15 | 12 | 296 | 5 |
| 45 | | | 120 | | | 90 | 60 | | 15 | 12 | 296 | 5 |
| 46 | | | 120 | | | 90 | 60 | | 15 | 12 | 296 | 5 |
| 47 | | | 120 | | | 90 | 60 | | 15 | 12 | 296 | 5 |
| 48 | | | 120 | | | 90 | 60 | | 15 | 12 | 296 | 5 |
| Total | 143 | 388 | 5676 | 329 | 235 | 3102 | 2334 | 1772 | 132 | 96 | 14208 | |

# ANNEXURE B

HSE Displays

## A. Types of Displays

### 1. Based on Content

| SN | Type |
|---|---|
| **1.** | **HSE Hazards & Precautions**<br>Height Work, Housekeeping, Fire Safety, PPEs, Hot Work, Lifting & Rigging Activity, Site-specific Hazards – eg. for Refineries, Nuclear plants etc.; COVID Precautions; Environment Protection etc. |
| **2.** | **Other Displays, Signage etc.**<br>HSE Policy, ISO Certificate, Safety Statistics, Assembly Area Location/ Route, Emergency Contact Numbers, Site Safety Rules & Regulations, Speed Limit, Work in Progress, Lock-Out Tag-Out (LOTO) Boards etc. |

### 2. Based on Mounting

| [Type 1] | [Type 2] | [Type 3] |
|---|---|---|
| Flex Sign Boards of Wooden Frame – directly mounted on Structures (walls, stairs, railings etc.) | Flex Sign Boards with Wooden Frame – mounted on metallic/ wooden legs – preferably double-sided | Coloured weather-proof Paintings on Walls (after due concurrence of BHEL/ Customer – Type 1 in case of no concurrence/ space) |

## B. General Requirements:

a. Displays should be weather-proof as per installation location, i.e. rain-proof, wind-proof and sun-proof.
b. Installation location and size to ensure visibility for the intended viewers (workers and moving personnel)
c. Displays to have at least 50% graphical elements preferably (as applicable). Language should be understandable by majority of the workers
d. Displays to be relevant to the hazards in the area
e. Proper installation to ensure boards don't obstruct activities and should not be prone to fall so as to pose danger
f. In case of multiple elevations (eg. Boiler, Power-house etc.), each elevation to have displays for applicable hazards including Height-Work, Housekeeping
g. For temporary work locations, posters/ boards may be erected and shifted after task is over
h. Minimum size of displays should be A1 unless otherwise specified
i. In case of damage, displays shall be reviewed and repaired/ replaced
j. In areas where night work is envisaged, fluorescent displays shall be installed and these should comprise of at least 20-30% of total displays
k. Total Number of displays to be not less than 1 per 10 workers and are to be dynamically updated based on number of workers

**C. Area-wise Displays**

**Below is list of Area-wise displays that are to be installed at Sites (Numbers, locations may be adjusted for specific requirements)**

| SN | Area | Suggested Subjects | Minimum Size | Minimum Quantity | Locations |
|---|---|---|---|---|---|
| **1** | **Walls/ Foundations/ Cement Structures etc. belonging to the package area** | Safety Hazards Prevention and other HSE Awareness content | **[Type 3]** | As per BHEL assessment from time to time | |
| **2** | **Site Interior Roads belonging to the package area** | At least every 20 meters:<br>1. Speed Limit Indication, Safe Driving board<br>2. Boards for hazard awareness | 1.As needed **[Type 2]**<br>**2.** A1 or equivalent each [**Type 2]** | As indicated | Sides of Roads; Height to ensure good visibility |
| **3** | **Specific Package Areas** | **A. Common**<br>At entry to respective Package/ Work Area, each contractor to put up daily updated board with following for each shift:<br>1. Scope of work and start date<br>2. Emergency Contact Numbers<br>3. Emergency Assembly Location, Escape Plan<br>4. Locations and supervisors of various gangs in the area,<br>5. Current Work permit Details<br>6. Safety Supervisor Location assignments - Names, Mobile Nos., Assigned Locations<br>7. Details (Name, Contact No. etc.) of Package In-charge - Contractor & BHEL<br>8. Details (Name, Contact No. etc.) of Safety In-charge - Contractor & BHEL<br>9. LTI Free Man-days & details of last LTI also to be indicated<br><br>In addition, Area-Specific Displays as indicated in Table 1 | **A0**<br>**[Type 2]** | 1 per Package Area | Entry/ Ground Level |

**Table 1**

**(Area/ Package-wise HSE Display Plan – As applicable)**

| **Prepared By (Subcontractor)** | | | | |
|---|---|---|---|---|
| **S. No.** | **Area** | **Suggested Minimum No. of Displays & Types** | **Type** | **Numbers Installed** |
| 1 | Boiler | 3 per working elevation | **[Type 1]** | |
| 2 | Powerhouse | 5 per elevation | **[Type 1]** | |
| 3 | ESP | 5 Per Pass | **[Type 1]** | |
| 4 | Buildings | 5 per elevation | **[Type 1]** | |
| 5 | Cooling Tower (NDCT/ IDCT/ ACC) | 20 per Structure | **[Type 1]** | |
| 6 | Chimney | 20 per Structure | **[Type 1]** | |
| 7 | Fabrication Yard | 10 per Yard | **[Type 2]** | |
| 8 | Batching Plant | 5 per Plant | **[Type 1]** | |
| 9 | Material Storage Yard – Open | 20 per Yard | **[Type 2]** | |
| 10 | Material Storage Shed – Semi-Closed/ Closed | 10 per Shed | **[Type 1]** | |
| 11 | Electrical Booths | 2 per booth<br>+ Line diagram, Emergency contact details | **[Type 1]** | |
| 12 | Medical & First Aid Centre | 2 per Centre | **[Type 1]** | |
| 13 | Rest Shed | 2 per Shed | **[Type 1]** | |
| 14 | Canteen | 2 per Canteen | **[Type 1]** | |
| 15 | Drinking Water Area | 1 Per Outlet | **[Type 1]** | |
| 16 | Washing Water Area | 1 Per Outlet | **[Type 1]** | |
| 17 | Training Centre | 10 per room | **[Type 1/2]** | |
| 18 | Assembly Area | 5 | **[Type 1/2]** | |
| 19 | Stairs | 1 per landing elevation | **[Type 1]** | |
| 20 | Cylinder Storage Area | 5 +<br>Signage: Type of Gas, Empty, Filled etc. | **[Type 1/2]** | |
| 21 | Labor Colony | Electrical Safety with Distribution Plan/ Line Diagram - 1<br>COVID Precautions Posters – 5<br>Safety Awareness Posters – 10<br>Hygiene awareness posters - 2 | **[Type 1]** | |
| 22 | Others | As per requirement | **[Type 1/2]** | |

**Date:**

**Sign (Contractor)** **Sign (BHEL)**

# ANNEXURE C

HSE Tools/ Equipment/ Devices

Following equipment conforming to relevant IS/ISO/BS Codes/ Standards in indicated quantities shall be ensured by subcontractor. This list is tentative, not exhaustive. Quantity and date/ period of deployment shall be as per site requirement.

**A. HSE Tools/ Equipment/ Devices**

| SN | Item |
|---|---|
| 1 | Lifelines |
| 2 | Retractable Fall Arrestors |
| 3 | Safety Nets (10m X 5m) fire proof double mesh |
| 4 | Sky Climbers |
| 5 | Fire Blanket |
| 6 | Honey Bee Removal Suit & Kit |
| 7 | Scaffolding Pipes |
| 8 | Flashback Arrestors |
| 9 | Barricading Tape |
| 10 | Binoculars |
| 11 | Walkie-Talkies |
| 12 | LOTO kit |
| 13 | 24-Volt light |
| 14 | Sand Buckets |
| 15 | Hard barricading Pipes |
| 16 | Standby Fire kits |
| 17 | Hand-held Megaphone |
| 18 | Small Public Address System |
| 19 | Foldable Stretcher |
| 20 | Height Rescue Kit (Non-Motorized) |
| | (Others:) |

**B. Test & Measurement Devices**

| SN | Device |
|---|---|
| 1 | ELCB Tester |
| 2 | Multi meter (Light cables) |
| 3 | Earth Resistance Meter |
| 4 | Lux Meter |
| 5 | Sound Meter |
| 6 | Anemometer |
| 7 | Breath Analyzer (Alcohol) |
| 8 | Multi-gas dozi-meter/ detector |
| 9 | Gas leakage detector / alarm |
| 10 | Gas monitor (confined space) |
| 11 | Radiation meter & Badges |
| 12 | Blood Pressure Monitor |
| 13 | Fire detectors |
| 14 | Hand held signaling light |
| | (Others:) |

# ANNEXURE D

Rest Sheds

## 1. Determining the Number, Sizes and Locations of Rest Shelters

i. **Numbers:**

The number of rest shelters shall be determined based on maximum number of workers at any one time (across all shifts). Formula is:

Wmax = Maximum number of workers at any time in the Site

Space per worker = 1.1 sq meter

Total space required, Tspace = Wmax X 1.1

Based on total space requirement calculated above, the number of rest sheds can be decided according to availability of locations and concentration of workers – so as to ensure the required space.

ii. **Locations:**

The rest sheds should be so located so as to minimize the distance to be travelled by the workers from their locations of work considering all the practical constraints

iii. **Other:**

The Rest shelter should be fenced so that it cannot be used as parking area.

## 2. Design & Construction of Rest Sheds

### a. Permanent/ Long duration Rest Sheds

i. For locations where, permanent rest sheds can be constructed without possibility of removal for relatively long period of time, a semi-closed shed can be constructed covered with tin roof and supported with well-grouted beams. The floor of the shed to be preferably cemented/ solidified.

ii. Adequate structural requirements suitable to the local weather (wind/ rain etc.) to be ensured.

iii. The design of the rest shed to be approved by Civil Engineering Department of BHEL Site before commencing work

### b. Temporary/ Movable/ Portable Rest Sheds

i. For locations where, permanent rest sheds cannot be constructed either due to non-availability of permanent location or other reasons, temporary rest shed shall be constructed.

ii. Temporary rest sheds shall comprise of Tent arrangement carried out by professional agencies

## 3. Amenities in Rest Sheds

### a. Essential Amenities

Following amenities shall be essentially ensured in a rest shed:

i. Hygienic environment with regular cleaning and housekeeping (with records)
ii. Adequate illumination
iii. Adequate ventilation/ heating as per weather conditions
iv. Clean Drinking water source
v. Hand Washing area
vi. Toilets & Urinals
vii. Benches/ mats for sitting/ lying
viii. Any other essential requirement deemed necessary by the Site
ix. Dust bins of sufficient quantity/ size that are vacated each day/ as per requirement

### b. Additional/ Optional Amenities

Following amenities are optional but are recommended to enhance the level of satisfaction of work force:

i. Hot/ Cold drinks (Tea, Coffee, Glucose etc.) as per requirement
ii. Snacks
iii. Fans/ Coolers/ Heating arrangements as per requirement and weather conditions
iv. A nice, welcoming interior design, music etc.
v. Water cooler

## 4. Health & Safety Requirements of Rest Sheds

Use of asbestos in construction is banned and shall not be used.
In addition, following essential Safety features shall be ensured in Rest sheds:

i. Availability of Fire extinguishers (preferably CO2 type)
ii. Display of Safety Posters
iii. Pest/ reptile protection
iv. Mosquito prevention measures

## 5. Note:

Any suitable closed spaces/ newly constructed buildings etc. available at project may also be used for the purpose of rest shed with due concurrence of BHEL

# ANNEXURE E

Labor Colony

1. These Guidelines suggest minimum requirements. However, additional requirements based on feasibility and circumstances, while adhering to directions of GOI/District Administration/Local Authority guidelines to be considered
2. Norms for social distancing, training/ awareness, face masks, disinfection, sanitization, gate entry, quarantine, medical, action in case of suspect cases of COVID and other communicable diseases etc. to be followed as per Govt. and BHEL guidelines issued from time to time
3. Labor colony to be developed as close to the Site as possible to avoid lengthy commute
4. A "Suggestion Register" shall be made available at the labor colony for residents. The feedback shall be reviewed on weekly basis and acted upon by concerned Contractor. Same shall be reviewed periodically by authorized BHEL Site Official.
5. **Canteens, Latrines & Urinals, Washing Facilities, Creches, Residential Accommodation and other infrastructure/ facilities:**
   Numbers/ Quantities and Features of these facilities shall be in line with the following as applicable:

   a. BOCW Act & State Rules
   b. The Inter-State Migrant Workmen (Regulation of Employment and Conditions of Service) Act & State Rules
   c. Factories Act & State Rules
   d. Other Relevant Acts & Rules

6. **Cleanliness & Hygiene/ Housekeeping:**
   a. Regular cleaning of the labor colony to be ensured.
   b. Daily cleaning of Sanitary facilities.
   c. Proper drainage system to prevent water-logging
   d. Regular fogging to prevent spread of mosquitoes
   e. Prevention of foul smell through necessary interventions
   f. Dust suppression as per requirement
   g. Cutting of Grass at regular intervals and other necessary measures to prevent pests & reptiles
   h. Stray animals to be banned from labor colony.
   i. Outside every common facility, eg. Toilet, washroom, food hall/ canteen etc., provision of washbasin with flowing water and soap (preferably liquid soap) to be ensured
7. **Power Supply Layout:**
   Electrical supply Layout of Labor Colony shall have the provision of Safety devices like MCBs, ELCBs etc. and to be clearly displayed
8. **Washing & Drinking Water Availability**
   a. Adequate water to be provided in line with: "Estimation of Water Requirements for Drinking and Domestic Use (Source: National Building Code 2016, BIS)"
   b. Drinking water tank to be cleaned every week and sticker for the same pasted on the tank
   c. Drinking water source should be tested as per IS 10500
9. **Waste Disposal:** Separate bins for dry, wet and biomedical waste to be installed. These bins to be evacuated regularly
10. **Training & Awareness/ Displays**
    a. **HSE Awareness Displays**: Posters/ banners/ boards to be displayed in labor colony. Subjects of displays shall be precautions for applicable hazards at work site.
    b. **Emergency Contact Numbers** including that of Doctor, Hospital, Labor Colony Supervisor, HSE Officials to be displayed prominently

11. **Doctor Visits:**
    Regular and need-based visits by Doctors to be ensured through tie-ups etc.
12. **Inspection & Review:** Regular inspection of labor accommodation to be carried out by the Contractor as per prescribed format. Last inspection date, inspector and next due date to be prominently indicated near main gate
13. Provision of a Fair Price shop in the premises to be ensured as per requirement
14. Adequate arrangements to be ensured in case of children/ families

# ANNEXURE F

Toilets

Toilets (Latrines and urinals shall be ensured at Site and Labor Colony in accordance with the Inter-State Migrant Workmen Act, 1979 as given below:

| LATRINES | URINALS |
|---|---|
| 1. Latrines shall be provided in every establishment on the following scale, namely: -<br>a. Where females are employed, there shall be at least one latrine for every 25 females;<br>b. Where males are employed, there shall be at least one latrine for every 25 males:<br><br>Provided that where the number of males or females exceeds 190, it shall be sufficient if there is one latrine for 25 males or females, as the case may be, up to the first 100, and one for every 30 thereafter<br>2. Every latrine shall be under cover and so partitioned off as to secure privacy, and shall have a proper door and fastenings. | 1. There shall be at least one urinal for male workers up to fifty and one for female up to fifty employed at a time:<br>Provided that where the number of male or female workmen, as the case may be, exceeds 500 it shall be sufficient if there is one urinal for every fifty females up to the first 500 and one for every 100 or part thereof thereafter.<br>2. The urinals shall be designed and located so as to ensure privacy. |

Important:

1. Where workers of both sexes are employed there shall be displayed outside each block of latrine and urinal a notice in the language understood by the majority of the workers 'For Men Only', or For Women Ónly', as the case may be.
2. The notice shall also bear the figure of a man or of a woman, as the case may be.
3. The latrines and urinals shall be conveniently situated and accessible to workers at all times at the establishment.
4. The latrines and urinals shall be adequately lighted and shall be maintained in a clean and sanitary condition at all times.
5. Latrines and urinals other than those connected with a flush sewage system shall comply with the requirements of the public health authorities.
6. Water shall be provided by the means of tap or otherwise so as to be conveniently accessible in or near the latrines and urinals.
7. At Site, on ground, Modular Bio-toilets as per industry standard specifications and regular professional cleaning shall be ensured. The toilets should be sufficient in number and easily accessible to workers from every work area
8. At Site, in various elevations, suitable urinals with proper drainage to be ensured at each elevation in line with IS 2064 (1993). Same to be cleaned regularly

# ANNEXURE G

Fire Extinguishers

| SN | Type of Fire Risk (Class of Fire) | Extinguishing Medium & Relevant INDIAN STANDARD | Scale of Equipment (Minimum recommended) |
|---|---|---|---|
| **1.** | **CLASS 'A'** Fires involving ordinary combustible materials like wood, paper, textiles, rubber etc. (Ordinary hazard or low fire load) | WATER Soda acid type, water type (gas pressure) and water type (constant air pressure) IS: 934 -1976; IS: 940 -1976; IS: 6234 -1971 | For every 600 square meter floor area or part, one 9-litre capacity. Minimum 4 numbers per floor or room; should not be required to travel more than 15 meter to reach any extinguisher. |
| **2.** | **CLASS 'A'** (Extra hazard &high fire load) | -do | -do – (Also, consult local fire authority). |
| **3.** | **CLASS 'A'** (Special hazards) | -do | -do – Extra provision For every 100 square meter floor area or part, one 4.5 Kg. CO2; minimum 2 numbers per room; should not be required to travel more than 10 meter to reach any extinguisher. |
| **4.** | **CLASS 'B'** (Fires in flammable liquids like oils, solvents, petroleum, products, varnishes, paints, etc. where blanketing effect is essential) (Storage and handling in small quantities) | FOAM / CARBON DIOXIDE / DRY CHEMICAL POWDER IS: 933 -1976; IS: 2878 1976; IS: 2171 1976; IS: 4308 -1982 | For every 50 square meter floor area or part, 2 numbers 9 -liters foam or 5 kg dry powder; should not be required to travel more than 10 m in the area of storage to reach any extinguisher. |
| **5.** | **CLASS 'B'** (Bulk storage other than in tank form)) | -do - | -do- (but minimum 3 numbers per room) |
| **6.** | **CLASS 'C'** (Fires involving gaseous substances under pressure where it is necessary to dilute the burning gas at a very fast rate with an inert gas or powder) (storage and handling of gas cylinders) | CARBON DIOXIDE / DRY CHEM. POWDER. The best way to extinguish such fire is by stopping the flow of fuel gas to the fire. Container is kept cool with water spray. IS: 2878 1976; IS: 2171 -1976; IS: 4308 -1982 | For every 100 square meter floor area or part; 2 numbers, 10 kg powder extinguisher or 6 kg C02; minimum 3 nos. per room; should not be required to travel more than 10 meter to reach any extinguisher. |
| **7.** | **CLASS'D'** Fires involving metals like magnesium, aluminum, zinc, potassium etc. where the burning metal is reactive to water and which require special extinguishing media or technique | SPECIAL DAY POWDER IS: 2171 -1976 IS: 4861 -1968 | For every 50 square meter floor area or part, 2 nos. 5 kg special dry powder; minimum 3 nos. per room; should not be required to travel more than 10 meter to reach any extinguisher. |
| **8.** | **MIXED OCCUPANCY** (electrical); Generators; Transformers; etc. | CARBON DIOXIDE DRY POWDER, IS: 2878 1976; IS: 2171 -1976 | For every 100 square meter floor area or part one 10 kg C02. Minimum 2 numbers for every location should not be required to travel more than 10 meter to reach an extinguisher. |
| **Note**: Due to peculiarities of the power plant construction sites, there would be locations in the construction areas of Boiler, Turbine, Generator, Transformer, etc. where different types of fire risk (classes of fire) may co-exist. Special care shall be taken while selecting and installing portable fire extinguishers for such locations so that all types of fire risk that may co-exist, are adequately covered. Similar special care shall be taken for storage areas. | | | |

a. All Electrical welding booths shall be equipped with appropriate Fire Extinguisher

b. Appropriate Fire Extinguishers shall be made within easy reach of all welding operations
c. Fire extinguishers shall be regularly tested and last checked date to be indicated on each. Master list shall be prepared with location and details
d. Providing appropriate fire-fighting equipment at designated work place and nominate a fire officer/warden adequately trained for his job.
e. Subcontractor shall provide enough fire protecting equipment of the types and numbers at his office, stores, temporary structure in labour colony etc. Such fire protection equipment shall be easy and kept open at all times.
f. The fire extinguishers shall be properly refilled and kept ready which should be certified at periodic intervals. The date of changing should be marked on the Cylinders.
g. All other fire safety measures as laid down in the “codes for fire safety at construction site” issued by safety coordinator of BHEL shall be followed.
h. Non-compliance of the above requirement under fire protection shall in no way relieve the subcontractor of any of his responsibility and liabilities to fire incident occurring either to his materials or equipment or those of others.
i. Emergency contacts nos. must be displayed at prominent locations
j. Tarpaulin being inflammable should not be used (instead, only non-infusible covering materials shall be used) as protective cover while preheating, welding, stress relieving etc. at site.

# ANNEXURE H

HSE Compliance Certificate

Bill Ref no:_____Date:_____

NAME OF THE AGENCY: _____ Work-Area/Package:_____

| Sl. No. | Description | Remarks |
|---|---|---|
| 1 | **HOUSE KEEPING**: | |
| 1.1 | All working areas at site (specific to the agency) are free from garbage's, scraps & any other undesired non-plant materials. There is no encroachment in safe passage of man, material & T&P to carry out activities safely | |
| 1.2 | All the plant materials under the custody of the agency are stacked & stored properly. | |
| 2 | **GENERAL ILLUMINATION**: | |
| 2.1 | ALL the working areas at site & office of the agency including passages are having proper & sufficient illumination. | |
| 3 | **STATUTORY & REGULATORY REQUIREMENT**: | |
| 3.1 | Sufficient water for drinking & other purposes and sanitation in work area and labour colony are available. | |
| 3.2 | Periodical Medical check-up of workers & staff done regularly & report submitted to BHEL | |
| 3.3 | Regular EYE testing is done for Crane operators/Welders and data's are available with agency | |
| 3.4 | All the T&P, Cranes etc used by the agency are having proper T.Cs & Fitness certificate available from competent authority. | |
| 4 | **SAFETY COMPLIANCE:** | |
| 4.1 | Number of Tool box meetings between Safety officers, erection staff & workers of the agency held in this month with location mentioned | |
| 4.2 | All precautions & Safety measures including PPE compliances are taken before working at HEIGHT | |
| 4.3 | Permit for working at Height is taken & complied accordingly | |
| 4.4 | ELCB is used in Construction Power Supply source by the agency & Proper Distribution board and electrical cabling has been used by the agency and regularly checked by electrician & safety officer of the agency | |
| 4.5 | Unsafe areas barricaded properly &unsafe opening closed properly | |
| 4.6 | Proper Platforms & Hand-rails used In areas earmarked earlier | |
| 4.7 | Proper safety signage's, Slogans & Emergency contact phone numbers including FIRE contact nos. are made available by the agency in locations mentioned | |
| 5 | Whether any penalty imposed by BHEL towards non-compliance of above points. | |

| **VENDOR'S SIGNATURE** | |
|---|---|
| Erection Engineer | |
| HSE Officer | |
| Site-in-Charge | |

| **BHEL'S SIGNATURE** | |
|---|---|
| Erection Engineer | |
| HSE Officer | |
| Package-in-Charge | |

# ANNEXURE I

Activity-Specific Safety Precautions/ Controls

## INDEX OF CONTENTS

## General

The philosophy of hierarchy of controls as below shall be followed

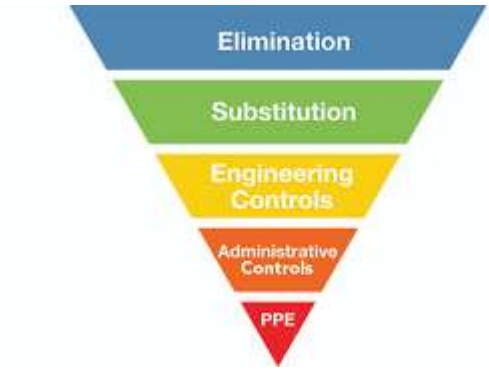



Fig. 1.1

It shall be ensured that there are multiple protections against any accident/ incident. For example, for height work there shall be safe platforms and walkways, Safety Nets and Lifelines for hooking double lanyard Safety harness by workers.

Monitoring and modifying worker behavior shall be part of ensuring safety. All personnel should be competent and trained for the job

Brief Safety guidelines for various hazardous activities are indicated below, besides the mandatory requirements based on Hazard Identification studies, HSE Procedures, Operational Control Procedures, Work Permits, applicable Indian Standard Codes and other provisions detailed in this document. Constant supervision at all times to be maintained by Execution & Safety Team to ensure implementation of these provisions.

## 1. WORK AT HEIGHT:

a. All work at height above 2 meter above ground level without complete platforms, handrails and other related fall protection shall require a work permit in the prescribed form. This shall require approval by the competent authority. The HSE officer of sub-contractors shall follow the checklist religiously by physically verifying the condition of the work area before recommending for approval.

b. Prior to the start of work at elevation, the HSE Officer involved with the work must meet the work supervisor to review the scope of work, and must review all the possible fall hazards and effective safety responses. The evaluation / analysis must be documented and kept on file and on site by the HSE Officer.

c. Whenever a fall hazard or other exposure exists for working at heights more than 2.0m/6ft, the nature and scope of work will be evaluated for conditions and environmental factors before selecting the appropriate fall protection system (active, passive or a combination of measures, as appropriate).

d. All Engineering and Administrative Controls including barricading, safe platform, Safety Nets etc. shall be made available at work location. Under no circumstances, there shall be total reliance on PPEs only

e. **Safety Nets**

   i. Contractor shall maintain sufficient stock of Safety Nets for deployment

   ii. Safety Nets as per IS: 11057:1984 should be used extensively for prevention / arrest men and materials falling from height.

   iii. The safety nets shall be fire resistant, duly tested and shall be of ISI marked.

iv. Safety Nets shall be deployed below all platforms where height work is envisaged. Duration of work, delay shall be no excuses for non-installation of Safety Net

f. Reaching beyond barricaded area without lifeline support, moving with support of bracings, walking on beams without support, jumping from one level to another, throwing objects and taking shortcut must be discouraged.
g. Monkey Ladder shall be fitted with cages. Rope ladder should be discouraged.
h. In case of pipe-rack, persons should not walk on pipes and walk on platforms only.
i. In case of roof work, walking ladder/ platform should be provided along with lifeline and/ or fall arrestor.
j. For chimney or structure painting, both hanging platform and men should be anchored separately to a firm structure along with separate fall arrestor.
k. The procedures for the safety response to identified fall hazards developed and rescue plans must be reviewed with all individuals exposed to the hazards.
l. The HSE Officer must establish an inspection process of fall protection systems. Some equipment requires documented inspections by its manufacture on a regular schedule. Such equipment must have evidence of the inspection and re-certification process on it. This information must be reviewed before the equipment is actually used. Individuals must visually inspect the fall protection equipment before each use. Failure to complete this inspection process could result in serious injury or death.
m. Immediately remove from service any fall protection equipment that is identified as defective, damaged, or has been subjected to an impact. Damaged fall protective equipment must be destroyed to prevent re-use and not be discarded into trash containers, as the worn or damaged equipment could be unintentionally re-used.
n. Aerial lifting devices, excluding scissor lifts require the use of full body harnesses and lanyards in any elevated position.
o. Where Height related works are applicable then rescue team (consist of 5- 10 person) shall be identified and trained for potential rescue.

## 1.1 Personnel fall protection system must include:

**a. Safety Harness**

All height workers must use Full Body Safety harness with double lanyards with shock absorber (only). The primary lanyard is never unhooked until the secondary lanyard is secure. The design of the working platform should be such that under no circumstances, worker should have both lanyards unhooked while at height.

**b. Lanyard**

i. The type of work and the environment conditions determine lanyard and lifeline selection. If welding, chemical cleaning that may damage lanyards, connectors or lifelines, sandblasting, etc., either protect the components or use more appropriate type of system.
ii. Lanyards and lifelines must incorporate, or be used with, an appropriate deceleration (shock absorbing) device. Deceleration devices include rope grabs, rip-stitch lanyards, specially woven lanyards, tearing, or deforming lanyards, automatic self-retracting lifelines and lanyards which dissipate or limit the energy imposed on the employee during fall arrest.
iii. Once in use, the system's effectiveness is to be monitored. In some cases, a program for cleaning and maintaining the system may be necessary. Lanyard and lifelines must use locking snap hooks only and under

no circumstances must two lanyard snap hooks be connected.

**c. Lifeline**

All lifelines in general are to be made of min 12mm dia. steel rope (plastic coated) and tied to columns with 3 clamps at each end. Wherever columns are not available to tie the lifelines, the vertical posts as per the design below are to be provided after carrying out drop load test initially. A load of 240kg to be dropped off the mid-point of lifeline in this test.

**d. Lifeline Post**

**DIAGRAM : LIFELINE POST**

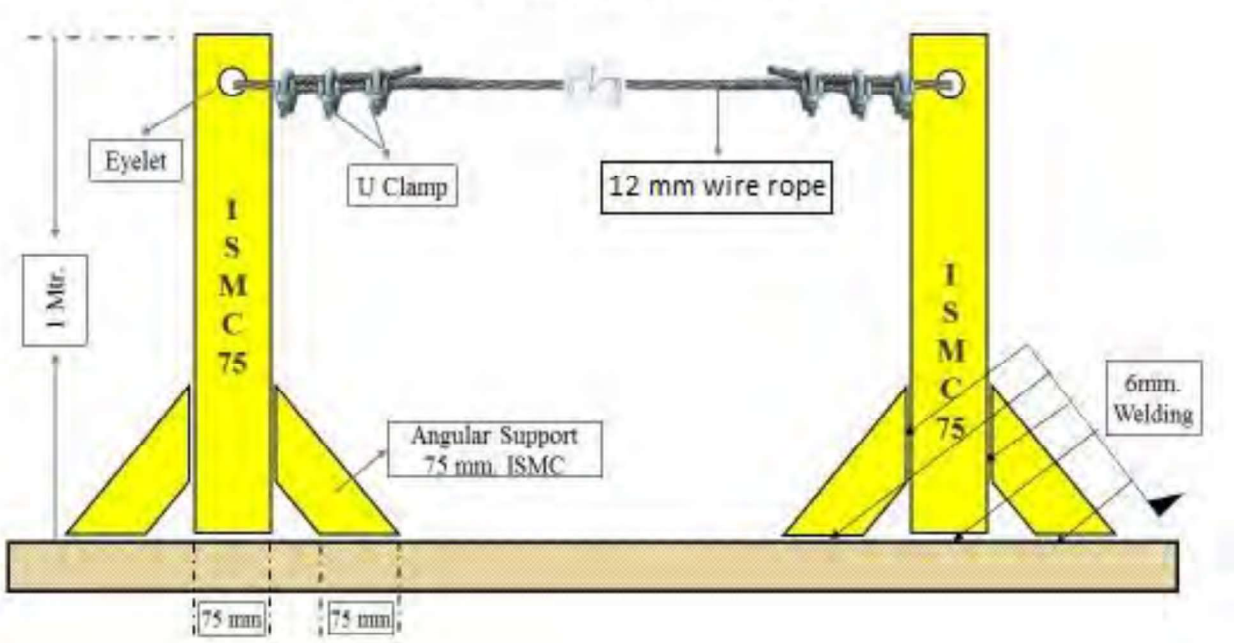



**Fig. 2.1 Lifeline Post**

i. The support at vertical post shall be fixed at end-to-end (welded/ bolted). The maximum length of one end to another end shall be 6 meters

ii. If the length of a lifeline is more than 6 meters, then intermediate vertical post(s) are to be used. Such intermediate post(s) will act as supports and the lifeline rope should simply pass through the eyelets (holes) of such supports without being anchored

iii. The lifeline need not be wrapped / clamped to any intermediate post

iv. Such intermediate posts must be used at an interval of every 6 meters

v. The post(s) in which the original lifeline is to be installed should be capable of sustaining a tensile stress of 2268 Kgs.

vi. In a horizontal lifeline installation, maximum allowable sagging is 500-600 mm

vii. For a single spun lifeline, no more than 3(Three Nos.) persons are allowed to work; for more than two workers, another lifeline should be installed

viii. Horizontal lifeline should be so installed that it does not impede safe movement of workers

ix. All the installation work must be carried out by competent person with adequate knowledge

## 1.2 Working Platform

a. Working platforms, gangways and stairways shall be so constructed that they do not sag unduly or unequally and if the height of the platform gangways provided is more than 3.6 m above ground level or

floor level, they shall be closely boarded and shall have adequate width, which shall not be less than 750 mm and be suitably fenced.

**b. <u>Precautions against the fall of Materials, Persons and Collapse of Structures:</u>**

i. Every opening in the floor or a building or in a working platform shall be suitably barricaded to prevent the fall of persons by providing suitable fencing or railing whose minimum height shall be 90 cm.

ii. Adequate precautions should be taken such as the provision of fencing, or barriers to protect any person who might be injured by the fall of materials, or tools or equipment being raised or lowered. Hard barricading shall be made at such places made of scaffolding pipe & clamps covered with reflective net. Cradle may be used for lifting materials - however this shall be made of MS angles and flats only and duly certified by the HSE officer. Operators may also use designed containers for lifting small tools.

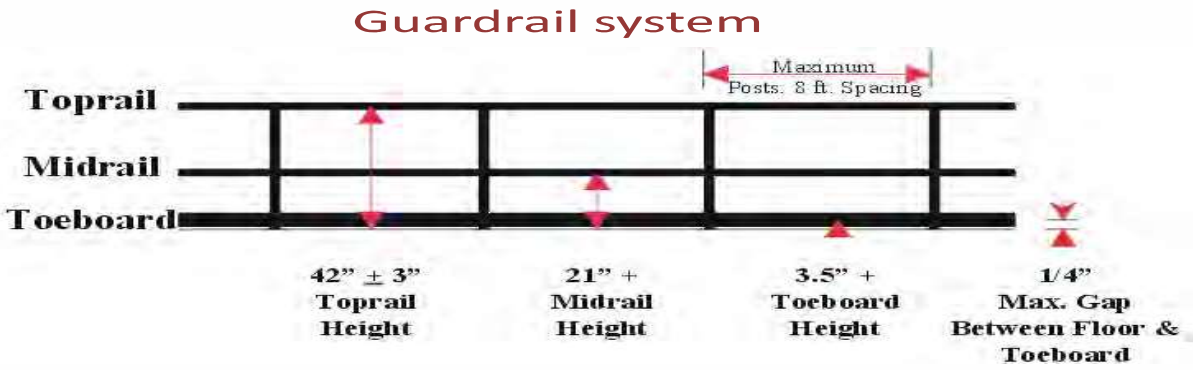
iii. Guardrails (including scaffolding) erected over/adjacent working areas must have the guardrails screened (opening < 0.5), to prevent material from falling outside the platform/decking.

iv. Guardrails must be able to withstand a 200-pound force exerted in any one direction.

v. Where necessary to prevent danger, guys, stays or supports should be used or other effective precautions should be taken to prevent the collapse of structures or parts of structures that are being erected, maintained, repaired, dismantled or demolished.

vi. All openings through which workers are liable to fall should be kept effectively covered or fenced and indicated in the most appropriate manner.

vii. Guardrails and toe-board/barricades and sound platform conforming to IS: 4912-1978 and other Indian laws and r




**<u>Fig. 2.2 Guard Rail System</u>**

viii. Guardrails shall be provided to protect workers from falling from elevated work places. The rails are generally made of MS pipes of suitable dia. Rebar shall not be used for any handrails, ladder or cover purpose. Wherever the guard-rails and toe-boards cannot be provided:

a. adequate safety nets or safety sheets shall be erected and maintained; or
b. adequate safety harnesses shall be provided and used and / or
c. adequate fall arrestor shall be provided and used.

As mentioned under PPE clause, all these PPEs shall be defect free and regularly inspected for any defect. The full body safety harness shall have double lanyard only with max 1.8m length.

ix. The monkey ladders shall have sufficient fall arrestors. Adequate lifelines of 8mm steel wire rope shall be provided across the work area.

x. The HSE officer shall recommend appropriate PPEs after analyzing hazards and risks involved.

## 1.3 Scaffolding

All scaffolds shall be conformant to the relevant standards including IS 3696 and IS 4014 as applicable. A sketch of the scaffolds proposed to be used shall be prepared and approval of the BHEL Engineer obtained prior to construction / use. Only cup lock type scaffoldings will be allowed in site. Where cup lock type scaffolding arrangement is not feasible by the virtue of the location, in that case only pipe and clamp type scaffolding will be allowed.

a. The scaffolding work must be carried out by a competent person, who shall train the scaffold users on safety aspects
b. All scaffolds shall be erected / dismantled by scaffolding crew under direct supervision of competent scaffolding supervisors.
c. All scaffolds shall be capable of supporting 4 times maximum intended load and erected on sound, rigid footing, capable of carrying the maximum intended load without settling or displacement. Bamboo scaffolding is not permitted for use on site.
d. Each employee on the scaffold shall use an approved safety harness attached to an independent lifeline. The lifeline is to be securely attached to substantial members of the structure (not the scaffold itself) or to securely rigged lines, which shall safely suspend a worker in event of a fall.
e. Guard rails and toe boards shall be installed on all open sides and ends of platforms more than (2) meters above ground or floor
f. Scaffold planks must be at least 5 cm x 25 cm (2" x 10") full thickness lumber scaffold grade or better.
g. Scaffold planks shall not span distances greater than 2.5 meters (8 feet).
h. Scaffold planks shall extend over end supports not less than 6 inches nor more than 12 inches and be secured to the scaffold. Scaffolding and accessories with defective parts shall be immediately repaired or replaced.
i. All scaffolding must be a minimum of two planks wide. No one may work from a single plank.
j. Scaffold planks must be inspected before use. Planks that have been damaged must be removed from the site.
k. Access ladders must be provided for each scaffold. Climbing the end frames is prohibited unless the design incorporates an approved ladder.
l. Adequate mudsills or other rigid footing capable of withstanding the maximum intended load must be provided.
m. Scaffolds more the 6 meters (20 feet) in height must be tied to the building or structure at intervals which do not exceed 4 meters (13 feet) vertically and 6 meters (20 feet) horizontally.
n. Do not overload scaffolds. Material should be brought up as needed. Scaffolding must not be loaded in excess of its rated capacity.
o. Barrels, boxes, kegs, blocks or similar unstable object must never be used as work platforms or to support scaffold.
p. Where persons must work under or pass under a scaffold then a 18 gauge wire mesh screen must be installed between the toe board and guard rail.
q. Employees exposed to overhead hazards while working on a scaffold will be protected by 5 cm (2") thick planks.
r. Wooden/bamboo ladders shall not be allowed at any cost. Ladder's rungs shall be fitted /welded

properly. Before every use the rungs should be checked for safe use.

s. Wooden scaffolds shall not be used in areas where fire / fire products are expected

t. Ropes made of jute / Plastic and other fire prone material shall not be used to tie up scaffolding components together

u. The platform should have permanent hand rail and mid rail with Toe board without fail.

v. All platforms are to be tightly planked for the full width of the scaffold, except as may be necessary for entrance openings. Platforms shall be secured in place.

w. On suspension scaffolds designed for a working load of 500 pounds, no more than two workers are permitted to work on the scaffold simultaneously. On suspension scaffolds with a working load of 750 pounds, no more than three workers are permitted on the scaffold simultaneously.

**x. Requirements for different types of Scaffolds:**

**A. Suspended Scaffold**

i. Suspended scaffolds are platforms suspended by ropes, or other non-rigid means, from an overhead structure.

ii. Requirements for use are to be preapproved by HSE Head, under a specific Permit to Work.

**B. Rolling Scaffolds**

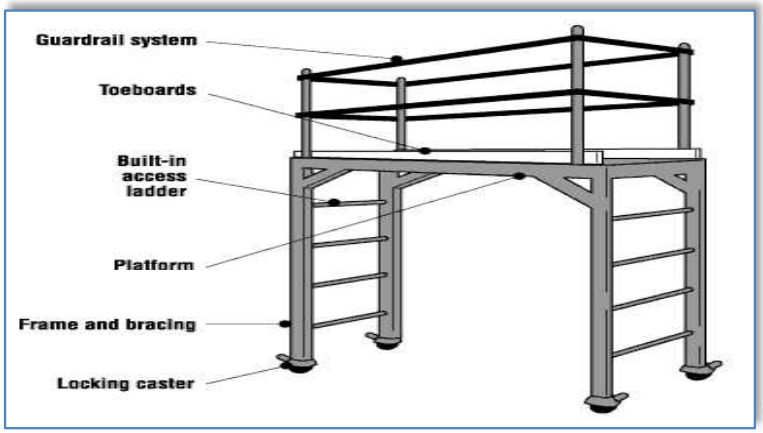
i. The height of rolling scaffolds shall not exceed three times the minimum base dimension.

ii. The minimum base dimension of rolling scaffold will be 1.25 meters (4 feet).

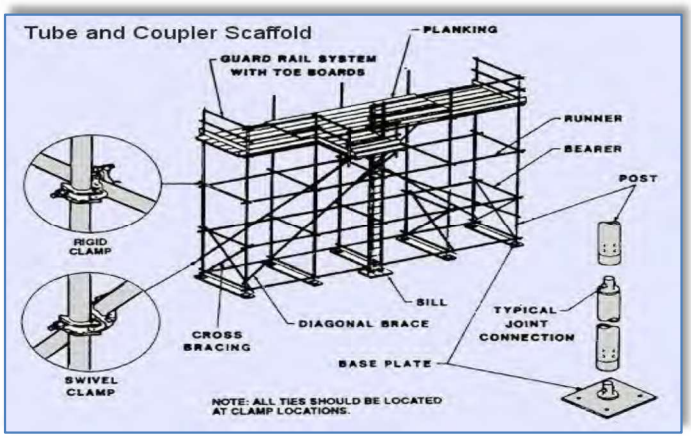
iii. Adequate help must be provided when moving a rolling scaffold.

iv. Secure or remove all loose materials, equipment and tools before moving a rolling scaffold.

v. No one is permitted to ride a rolling scaffold when it is being moved. Castor brakes must be locked-on when the scaffold is not being moved.




Rolling Scaffold




Tube & Coupler Scaffold

**Fig. 2.3 Types of Scaffolds**

## 1.4 Ladder Safety

A sketch of the ladders proposed to be used shall be prepared and approval of the BHEL Engineer obtained prior to construction / use

**a. Safe Use of Ladders:**

i. Fall protection is required when working on a ladder above 2 meters and when climbing above nearby guardrails.

ii. Ladders must be inspected prior to use and by a competent person quarterly, with documentation.
iii. Use portable ladders for height up to 4 M only
iv. Provide fixed ladders for height above 4 M
v. Place the ladder at an angle of 75 degrees (approx.) from the horizontal (1:4)
vi. Extend ladder at least 1 M above the top landing
vii. Secure top and bottom of the ladder firmly to prevent displacement- anti skid lining at the bottom
viii. Ensure that the width of the ladder is not less than 300 mm and distance between rungs is not more than 300 mm
ix. Provide landings of minimum size 600 x 600 mm at intervals not more than 6 M for fixed ladders. Check the ladders daily for any defects
x. Ensure that the areas around base and top of the ladder are clear. Getting on and off the ladder is more hazardous than using it. Use a mudsill if the ladder is to rest on soft, lose or rough soil
xi. Do not use ladders of conducting material near power lines, and only use ladders near power line or other energize system with exposed parts if they are confirmed locked-out and de-energized.
xii. Stand no higher than the fourth rung from the top for carrying out any job standing on a ladder.
xiii. Never reach out from a ladder to perform work where your belt buckle protrudes past the ladder rung.
xiv. Always face the ladder while climbing up or down
xv. Maintain three-point contact while climbing up or down a ladder i.e. two hands and one foot or two feet and one hand on the ladder at all the times.
xvi. Avoid climbing up or down a ladder while carrying anything in hands. Lift tools, equipment and materials with a rope.
xvii. Work from portable and extension ladders near guardrail where fall expose exists over the guardrail regardless of height, and above 2.0 mtr. heights from the working/walking surface will require the use of personal fall arrest equipment

## 2. EXCAVATION & CIVIL WORKS

All safety precautions shall be taken for foundation and other excavation marks as per IS-3764.

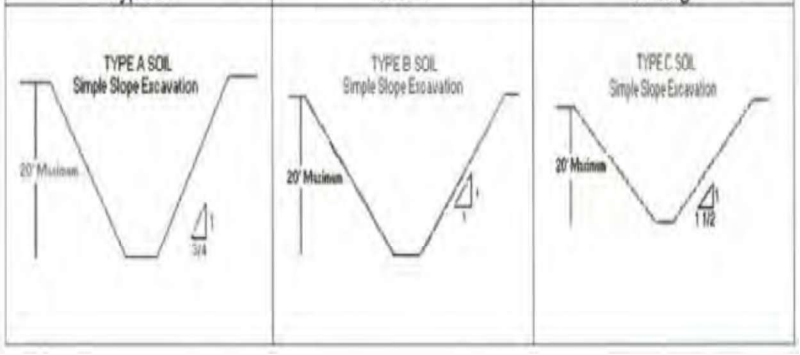
### 2.1 Excavation

The following safety measures are to be ensured before and during excavation:

a. All Excavation activities more than with depth of 1.22 meter or more shall require and Excavation Work Permit
b. Check for underground utilities like electrical / telephone cables, sewage, water lines and proper care has to be exercised to protect and prevent damage to it.
c. Electrical cables and service lines to be identified using cable detector/locator device before carrying out the excavation work
d. Proper and adequate slope is maintained while excavating
e. Adequate shoring or sheeting is done wherever require to prevent soil sliding
f. Safe access through ladder or steps for exit & entry to excavation
g. No material /excavated soil is kept within one meter from the edge
h. Safe way is planned and provided for movement of HEM /transport equipment near excavation
i. Safety helmet and shoes/gum boots are provided and worn by the workmen at excavation works

j. Dewatering arrangement is made where water seepage is prevailed.
k. Stop blocks are provided to avoid vehicles reversing into the excavated trenches
l. Danger signs /Caution boards are displayed at work spot
m. Hard Barricading is provided at excavated pits. It should be made of scaffolding pipe and clamp with reflective nets.
n. All Excavated area of depth 3mtr or more is to be hard barricaded with pipe.

| Soil Type | Height/Depth ratio | Slope Angle |
|---|---|---|
| Stable Rock | Vertical | 90 deg. |
| Type A | ¾ : 1 | 53 deg. |
| Type B | 1 : 1 | 45 deg. |
| Type C | 1½ : 1 | 34 deg. |




**Determining Soil Type**

| Type | Description | Examples |
|---|---|---|
| A | Cohesive soils with an unconfined compressive strength of 1.5 tons per square foot or greater. | Clay, silty clay, sandy clay, clay loam and in some cases: silty clay loam and sandy clay loam. |
| B | Cohesive soils with unconfined compressive strength greater than 0.5 tsf but less than 1.5 tsf. | Angular gravel (similar to crushed rock), silt, silt loam, sandy loam and, in some cases silty clay loam and sandy clay loam. |
| C | Cohesive soils with unconfined compressive strength greater than 0.5 tsf or less. | Granular soils such as gravel, sand and loamy sand; submerged soil or soil from which water is freely seeping; submerged rock that is not stable. |

**Fig. 3.1 Excavation Reference**

## 2.2 Piling

Ensure the following precautionary measures before starting piling works:

a. Inspection of piling equipment by responsible person for its condition before initiating piling operation.
b. Checklist and OCP for piling to be prepared using manufacturer's instructions and used
c. Testing and its certification wire rope, slings, D-shackles, chain pulley blocks using in the process of piling work by competent person
d. Adequate support and secured foundation of the piling equipment to avoid toppling
e. Hoses should be lashed and adequately secured
f. Proper work platform is to be provided on piling frame
g. Safe work procedures and close supervision to prevent unsafe acts of operators/any unsafe conditions that may arise
h. Only experienced and trained operators are engaged for the piling operation
i. Provision of Personal Protective Equipment (PPE) like safety shoes/gumshoes/safety helmet/safety belt etc. and its use by their workmen.
j. Special care and precautions If work is near electrical live cables/ electrical equipment
k. Cordoning of work area to prevent un authorized entry
l. Guarding of revolving parts
m. Specific measures to prevent over turning of pile driver/missing of hammer/ hammer movement out of range

## 2.3 Batching Plant Operation

Following Safety considerations for batching plant are to be ensured:

1. Modern type batching plant should be used in which all the moving parts are protected and emergency

and safety features are incorporated.

2. Installation of external Electric moto-vibrators in the feeding hopper of all batching plants to reduce human intervention.
3. Installation of safety devices like pull-chord on both the sides of conveyor for stopping the conveyor in emergency
4. Workers carrying cement / sand to be given appropriate PPEs like respiratory masks & gloves.
5. Conveyor belt/rotating parts must be guarded properly.
6. Safety awareness shall be inculcated in workmen about the risk involved in rotating parts.
7. The agency shall ensure to erect the batching plant as per drawing including installation of all safety devices as provided by manufacturer and witnessed by BHEL Engineer in charge before starting of machine in future.
8. Safety audit to also focus on Batching plant.
9. The site shall impose penalty on the agency who has violated the safety norms as per contract.

## 2.4 Mobile Plant

Mobile plant includes tractors, trailers, dumpers, excavators, bulldozers, road rollers etc. for earthmoving purpose and concrete mixers, concrete transit mixtures, concrete pumps etc for concreting purpose. Due to the very nature of their function and movement in difficult terrains, congested areas, working in tandem with manual work and other operations the danger is inherent.

Automatic reverse camera with reverse horn connected with reverse gear is compulsory for all moving machineries.

**Following Safety measures to be ensured for Mobile Plant:**

a. Where movement around site is involved, routes should be planned, obstruction free and well maintained
b. Observe specified speed limits
c. Operating personnel should be aware of associated risks and its preventive measures
d. Only experienced, trained and authorized persons with valid license (wherever applicable) should operate the mobile equipment/vehicles
e. Provide and use Warning lights and reverse horn for cautioning the people around
f. Operation should be on level and stable ground with adequate working clearance.
g. Loading of out riggers/stabilizers should be well within safe ground bearing capacity
h. No person should be on equipment or vehicle during loading and unloading of material
i. Operators should be protected by warning barriers or switching off power when working in close proximity of overhead power lines
j. The equipment /vehicles should be well maintained and provided with effective brake system and other safety devices (wherever require)
k. Rotating parts of equipment should be adequately guarded
l. Provide necessary personal protective appliances and ensure its use by the operating personnel Ensure effective measures at source to control harmful emissions, dust, fumes contaminating atmosphere and cause health hazards to the operators and people in the vicinity.
m. No overloading/over stressing of vehicles/plant is allowed
n. Hoses, pipes, receivers, gauges and valves involved in carrying out hydraulic fluid/ compressed air should be checked for leaks and tested prior to operation.

o. Adequate safe clearance for swing and movement is to be judged during operation of Concrete mixer
p. Setting of machines on firm and level ground with wheel locked to prevent movement of machine
q. Proper instructions and Special precautions are to be ensured to prevent entry in to the danger zone of projectile of bucket while dropping bucket
r. Operator leaving work spot should ensure that the equipment/vehicle is kept in neutral position and place on firm and level ground.
s. The hand brake should be kept in position and block road wheels as additional safety measure
t. Blades/buckets should be kept low while moving
u. The dozer blades should not be used as brakes except in emergency
v. The ground should be examined for its bearing capacity and general safety especially when operating road roller at the edges of slopes, embankments.
w. The roller should not be moved downhill with the engine out of gear
x. If operating near excavations the following precautionary measures are to be ensured
y. Barricading, edge protection to prevent fall of persons/vehicles over running while reversing etc.
z. Suitable support system and adequate allowance to avoid the danger of side collapsing
aa. Experienced signaler /attendant should be always accompanied with operator/driver for proper direction /signal and also to caution others in the working Zone during operation of mobile plant

**2.5 Concrete Vibrators**

a. Revolving parts/belt drives should be adequately guarded and Vibrating unit shall be completely enclosed and have suitable overload relays and effectively earthed
b. Ensure sufficient length of cable to the Vibrator.
c. Ensure electric starters and other accessories are firmly fixed adequately supported
d. Ensure locking of needle load while inserting needle in to the vibrator,
e. Ensure periodical lubrication and maintenance

**2.6 Concrete Mixers**

a. Setting of machines on firm and level ground with wheel locked to prevent movement of machine
b. Proper instructions and Special precautions are to be ensured to prevent entry in to the danger zone of projectile of bucket while dropping bucket

**3. WELDING & GAS CUTTING SAFETY (HOT WORK)**

a. All Hot Work shall require a Hot Work Permit
b. Inbuilt Voltage Reduction Device (VRD) equipped arc welding machine will only be allowed for work.
c. There shall be flash-back arrestors conforming to IS-11006 at both cylinder and burner ends. Damaged tube and regulators must be immediately replaced.
d. All safety precautions shall be taken for welding and cutting operations as per IS-818.
e. When possible, items to be welded, cut, heated, etc. shall be moved to a safe location free of combustible or flammable material. If this is not possible, then all combustibles/ flammables that can be removed from the area shall be removed within a 35-foot circumference and a positive means of confining arcs and sparks generated by the process shall be ensured and additional person(s) shall be stationed as fire-watch for the area(s) still exposed, along with obtaining the Hot Work Permit as applicable.
f. Appropriate fire-fighting equipment is to be available in close proximity of any welding and gas cutting operations at all times suitable for the type of Fire.

g. Drums, tanks, and similar containers that have contained flammable or toxic material shall not be welded, cut, or heated until they have been made safe by water filling, thorough cleansing or similar accepted practices. The container shall also be ventilated during the welding, cutting, or heating process.
h. Proper ventilation is required for any welding or torch operations performed in a confined space.
i. Any welding or gas cutting operations performed on metals of toxic compounds or coating such as zinc, stainless steel, lead, cadmium, chromium, and beryllium shall be properly ventilated and/or proper respiratory protection shall be worn by any person that could be exposed to fumes, vapors, and gasses created by the welding and gas cutting processes.
j. Wherever it is practical, all arc welding operations shall be shielded to prevent direct light rays or sparks from contacting persons in the vicinity or from reaching areas normally used to travel through or into the vicinity. Where this is not practical, persons who shall be in the area are to use proper eye and skin protection. Other persons who are not participating in the welding or gas cutting operations are not to be allowed into the hazard zone.
k. Welders and other employees who are exposed to arc welding radiation shall wear suitable clothing and protective apparel to prevent burns and other types of ultraviolet radiation damage to the skin.
l. Arc welding machines shall be shut down when being moved or when they are not in continuous use. Electrode holders left unattended shall have electrodes removed and shall not be left where they might contact employees or conducting objects.
m. Arc welding power supply cable shall be of proper rating and material, e.g. copper.
n. Welders shall guard against allowing materials adjacent to or behind them to reflect radiation back toward them or towards others in the area. Reflected radiation can cause skin burns and eye flash burns.
o. Valve caps shall be in place when cylinders are not in use. Valve caps shall never be used for lifting the cylinder vertically.
p. Torches shall only be lit by approved strikers; never with matches, cigarette lighters, or hot-work.
**q. Splatter / Slag Collector:**

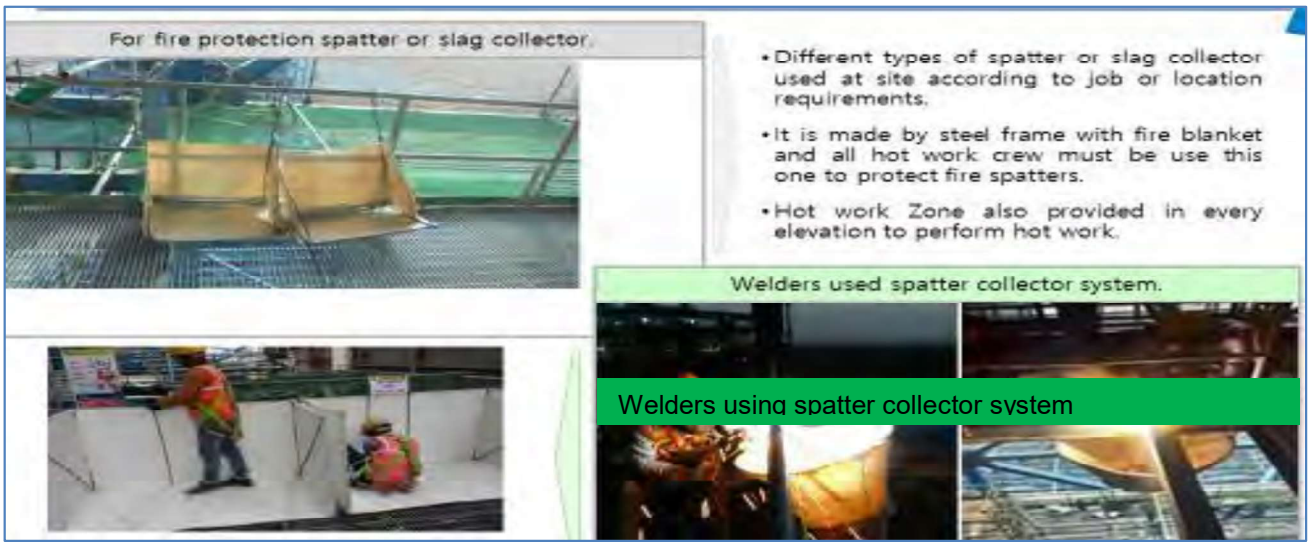



**Fig. 4.1 Splatter / Slag Collector**

While carrying out job at height, the sparks or molten slag shall be prevented from falling down by putting a fire-resistant (non-asbestos) sheet or patter/ slag collector or even MS Sheet. The passage of falling sparks

or molten slag shall be barricaded till ground floor and any cable/ tubes/ any other objects interfering in the passages hall either be removed or covered with Fire-resistant sheet or MS Sheet.

**r. COMPRESSED GAS**

i. All cylinder valves shall be closed when any work is finished and when any Cylinders are empty or being moved. Valve protection caps shall be placed and secured properly before gas cylinders are transported, moved or stored.

ii. Compressed gas cylinders shall be secured in an upright position with chain or appropriate means during storage & use. However, a trolley shall be used for transportation.

iii. Compressed gas cylinders shall always be secured from tipping or falling, whether in use, in storage or in transit. The cylinders shall always be secured upright, except during times when actually being hoisted or carried.

iv. When cylinders are transported by powered vehicle they shall be secured in a vertical position.

v. Regulators shall be removed when cylinders are not in use or are in transit, unless the cylinder is firmly secured on a special carrier designed for this purpose.

vi. Gas cylinders are not allowed to be used in man-basket when occupied.

vii. Cylinders containing oxygen or fuel gasses shall not be taken into confined spaces.

viii. Oxygen cylinders shall be stored a minimum of 6 meters from fuel gas cylinders or shall have an approved firewall between them.

ix. All cylinders shall be kept at a safe distance from welding or cutting operations or shielded from arc/ sparks / slag.

x. All cylinders shall be placed where they cannot become part of the electrical circuit.

xi. Oxygen and acetylene shall not be stored together. Oxygen must be separated from acetylene (or ANY fuel gas) or combustible material by at least 20ft or a barrier with a 30-minute fire resistance rating.

xii. All Cylinders should be stored upright in a designated area with labels for the type of gas. All applicable precautions to be ensured during storage

xiii. Oxygen and fuel gas regulators, hoses and associated equipment shall not be altered and shall be in proper working order while in use.

xiv. Compressed air can be extremely dangerous if allowed to penetrate the skin. As such, the use of compressed air to clean off yourself or other workers shall be strictly prohibited.

xv. All gas cylinders shall be stored in upright position. Suitable trolley shall be used for cylinder movement, the design of which shall be submitted to BHEL Engineer for approval.

xvi. No of cylinders shall not exceed the specified quantity as per OCP

xvii. Cylinders shall be moved by tilting and rolling them on their bottom edges. They shall not be intentionally dragged, struck or permitted to strike each other violently.

xviii. All cylinder should be kept only in cylinder trolley.

xix. Cylinder shall be transported in upright vertical position by suitable mean.

**4. LIFTING & RIGGING SAFETY**

a. All Heavy / Complex Lifting operations as defined in Clause 6.12 shall require a Lifting Work Permit. A written rigging procedure and plan must be prepared for all individual heavy/ complex lifting operations.

b. All the cranes and lifting tools & tackles shall be inspected on daily / weekly basis as well as monthly by expert as per applicable formats.
c. In addition, inspection / certification as mandated by law shall be carried out wherein these shall be tested and certificates of fitness shall be obtained from 3rd party State Govt. approved competent agency before deploying at site and later periodically. BHEL shall be given advance intimation of any such inspections
d. The last date of Third-Party Inspection and the next Due date shall be conspicuously displayed on all cranes. A copy of certificate shall be pasted on operator's cabin of all the lifting equipment.
e. Specifically designed heavy steel plates lifting clamps shall be used for lifting heavy metal sheets. Manmade lifting clamp chapa shall not be used for lifting/shifting of plates.
f. Following requirements shall be mandatorily followed, wherever applicable:
    i. The manufacturer's instruction for maintenance shall also be followed. All safety measures shall be followed.
    ii. All tools tackles, lifting appliances; material-handling equipment etc. used by the subcontractor shall be of safe design and construction.
    iii. The operators, slingers and signalers shall be qualified as per IS 13367 (part-1):2003 "Safe use of cranes- code of practices".
    iv. There shall be a person responsible for co-ordination among cranes where multiple cranes are used, and lifting over load chart of the crane to be avoided.
    v. Mobile phone should be banned for crane operator and lifting operation. Only walkie talkie shall be allowed in rigging/Lifting purpose.
g. Lifts/Movements between 5 Tons and 20 Tons:
    i. Shall include a rigging plan, detailing schematic representation of the handling/lifting operations that must be included on the Method Statement.
    ii. When performing similar lifts of identical items, only one rigging plan need be prepared, provided each of the lifts can be performed in accordance with the rigging plan.
h. Lifts/Movements Less Than 5 Tons:
    i. An equipment rigging plan is not required for lifts less than 5 tons, safety measures are covered in the JSA. This could change as per BHEL requirement

**i. Personnel Lifts (Man-Basket / Jhoola):**

The design of personnel man basket shall be submitted to BHEL Engineer for approval before use. Relevant permit (Height work & others as applicable) shall be completed prior to lifting any people, along with a rigging plan.

i. A separate Lifeline / fall arrestor anchored to a fixed structure outside of Jhoola shall be provided for the workers inside the basket. All occupants of the basket shall have Safety Harnesses equipped with rope grabs, which are to be hooked to the vertical lifeline.
ii. Man-basket shall be used where access through ladders or scaffolding is not feasible.
iii. Man-baskets shall be designed and engineered by a manufacturer (job made man-baskets are not allowed, unless designed and tested by a certified engineer), and built robust with MS Angles and flats or plates or channels only.
iv. Guard rails top and mid, must be in place and screened-in to avoid material from falling out of

basket. The factor of safety shall be 200%.

v. It shall have a door with double latches and shall open inside. Anchor points shall be identified within the man-basket.

vi. The man-basket shall be thoroughly inspected and load tested and a trial run performed without personnel before being put to job.

vii. It shall be treated as a lifting tool (T&P Item) and shall undergo same certification cycle and inspection as other lifting equipment.

viii. An additional sling of required lifting capacity shall be fixed the man-basket main lifting point and attached to the crane above the ball or block.

ix. While lifting man-basket, the crane shall maintain a uniform speed of lift without any swing.

x. Once man-basket reaches the destination, the lift brakes shall be locked as long as the basket
   a. remains at that point. The same care shall be taken in its descent.

xi. As for hanging man-basket, the same shall be hung off a rigid structure with help U-shaped handle welded to man-basket. This shall be tested once in a year by a competent person.

xii. Use of Rebar steel for making and monkey-ladder must be avoided.

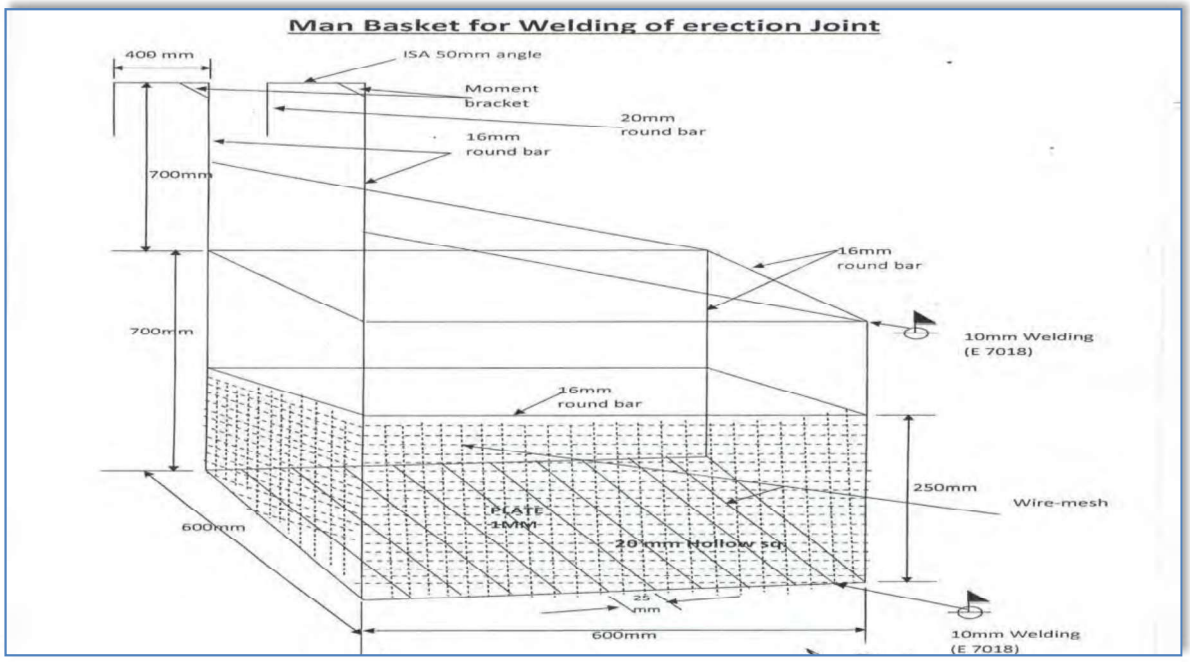



**Fig. 5.1 Man Basket for Welding Erection Joint**

## 4.1 Cranes & Hoisting Equipment:

This section provides the guidelines to ensure proper rigging and lifting activities are accomplished safely and in accordance with applicable specifications, codes, and regulations.

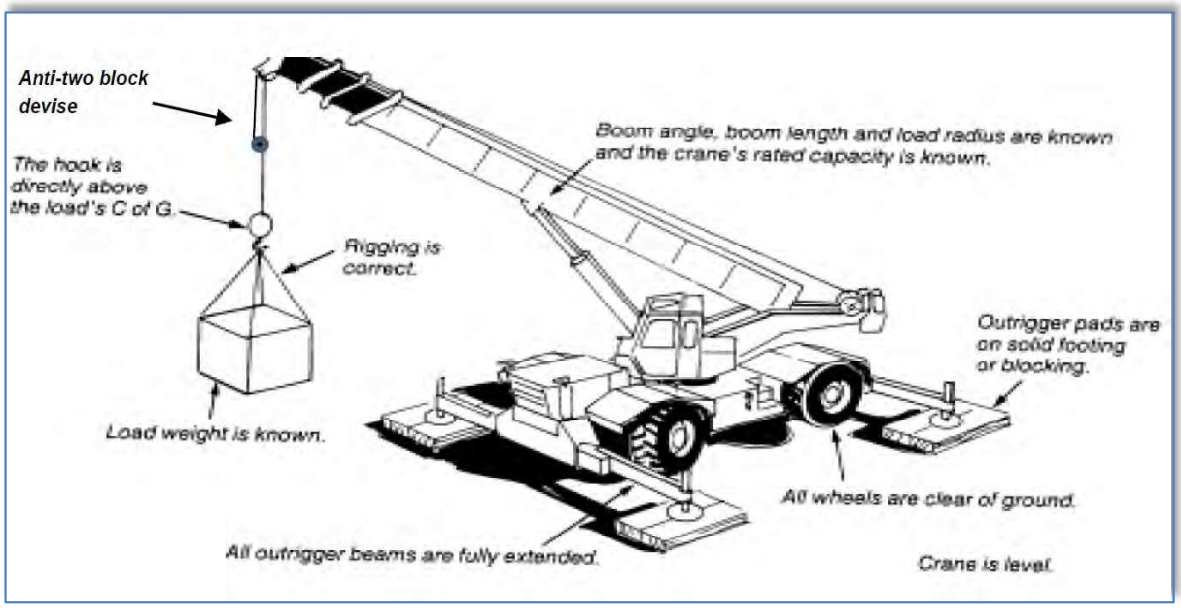



**Fig. 5.2 Proper Crane Setup**

a. On every crane or piece of hoisting equipment notices of all rated load capacities, recommended operating speeds, and any hazard warnings or special instructions shall be conspicuously posted. All instructions and warning shall be visible from the equipment operator 's station.
b. Cranes shall have an Anti-Two-block safety device installed
c. All mobile cranes shall have overload and backup alarms, load angle indicators and limit switches
d. All areas within swing radius of cranes that are potentially accessible by pedestrian, vehicular, or equipment movement shall be barricaded to prevent anyone or any vehicle or equipment from being struck by the crane or hoisting equipment, or its load(s).
e. No part of the lifting equipment or its load shall be within the distance as specified in the Indian Electricity Act from an energized power line
f. Cranes shall have annual certified third-party inspection and be inspected before use by the operator. Any defects shall be corrected before use. Logs of crane inspection shall be kept with the crane.
g. Make certain that the rigging personnel, material, and equipment have the necessary capabilities for the job and are in safe condition.
h. Communicate with person(s) directly responsible for accomplishing the work and / or work area to establish requirements/responsibilities and make certain that all preparatory work is complete.
i. Mats/Pads must be used on all lifting equipment, equipped with out riggers.
j. Pick and carry must have the load secured to the rig in front.
k. Only BHEL Approved Plate Lifting Spreader Beam configuration shall be used (Sample in Fig. 11.3.5.3)
l. Crane operators must follow the following:
    i. Pass an annual Operator's Physical examination
    ii. Carry a valid training certification card at all time while operating issued by the Govt. or other recognized institute.

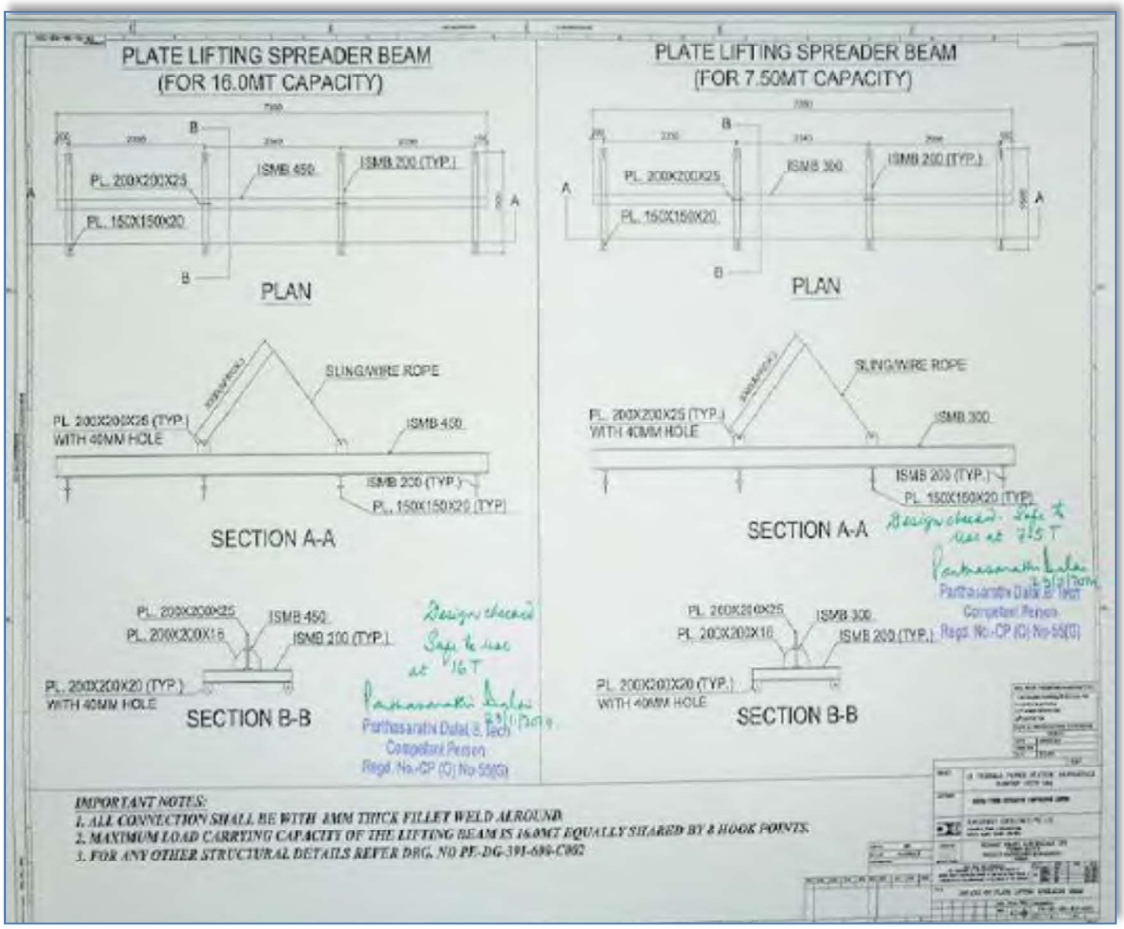



**Fig. 5.3 Typical Plate Lifting Spreader Beam Configuration for 7.5 MT and 15 MT Loads**

**m. Safe Rigging Practices**

i. Review the planned operation and requirements with the operator and rigging crew.

ii. Ensure a pre-lift meeting is conducted with crane operator, tagline operator, signal personnel, and Safety Manager.

iii. Designate a qualified person from the rigging crew to observe clearance of the equipment and give timely warning for all operations where it is difficult for the operator to maintain the desire clearance by visual means.

iv. Clear the lift area of all unnecessary personnel.

v. Hydras shall only be allowed for loading & unloading works & shall not be allowed to move with load

**n. Rules for Safe Rigging**

i. Use loops, thimbles and corner pads to prevent damage to slings when used around corners or on cutting edges.

ii. Never allow wire rope to lie on the ground for any length of time or on rusty steel or near solvents, chemicals or corrosive substances.

iii. Slings must not be pulled from between or under loads with load resting on the sling.

iv. Keep all rope away from flame cutting or welding operations.

v. Never use rope as sling material.

vi. Never wrap a wire rope completely around a hook.

vii. Do not bend wire rope near any attached fitting.

viii. The sling must be selected to suite the most heavily loaded leg rather than the total weight when using multi-legged sling to lift loads in which one end is heavier than the other.

ix. When using 3 and 4-legged sling configurations, any two legs must be capable of supporting the entire load.

x. Where possible, wire rope choker hitches must include a shackle with the eye around the shackle pin to prevent breaking wires of the choke. The choker hitch must be “snugged down” prior to lifting, not after tension is applied.

xi. Unless authorized by the hook manufacturer when more than two rope eyes are placed over a hook, install a shackle, pin resting in the hook, and place the rope eyes in the bowl of the shackle.

xii. Properly rig all loads to prevent dislodgment of any part.

xiii. Use guide ropes or tag lines to prevent the rotation or uncontrolled motion of the load when necessary.

xiv. Loads must be safely landed and properly blocked before being unhooked and unslung. Tag lines must not be used in situations that jeopardize the safety of the lift.

xv. Lifting beams must be plainly marked with their weight and designed working load and must only be used in the manner for which they were designed.

xvi. The hoist rope or chain must never be wrapped around the load. The load must be attached to the hook by slings or other rigging devices that are adequate for the load being lifted.

xvii. Multiple part lines must not be twisted around each other.

xviii. The hook must be brought over the center of gravity of load before the lift is started.

xix. If there has been a slack rope condition, determine that the rope is properly seated on the drum and in the sheaves prior to lifting.

xx. Keep hands away from pinch points as the slack is being taken up.

xxi. Leather gloves are recommended when handling wire rope.

xxii. Avoid impact loading caused by sudden jerking when lifting or lowering. Lift the load gradually until the slack is eliminated.

xxiii. Never ride on a load that is suspended.

xxiv. Avoid allowing the load to be carried over the heads of any personnel.

xxv. Never work under a suspended load until the load has been adequately supported from the floor and all conditions have been approved by the supervisor in charge of the operation.

xxvi. Never leave a load suspended unless emergency evacuation is required.

xxvii. Never make temporary repairs to sling.

xxviii. The capacity of a sling is determined by its angle, construction, type of hitch and size.

xxix. Never lift loads with one leg of a multi-leg sling until the unused legs are made secure.

xxx. Never point load a hook unless it is especially designed and rated for such use.

xxxi. Make certain that the load is broken free before lifting and that all legs are taking the load.

xxxii. When using two or more slings on a load make certain all slings are made from the same materials.

xxxiii. Lower the loads on to adequate blocking to prevent damage to the slings.

xxxiv. Materials and equipment being hoisted must be loaded and secured to prevent any movement which could create a hazard in transit.

xxxv. The weight of the hook, load block and any material handling devices must be included when determining crane capacity.

xxxvi. Calculated weights cannot exceed load chart without written approval.

xxxvii. Personnel must be completely clear of loads being picked up or set down by crane. Tag lines will be used to control the loads. Loads must not be touched by hand while placing/ moving.

**o. Slings**

The following are rules for safe use of synthetic slings:

i. Synthetic slings must be marked to show the rated capacity for each type of hitch and type of web material.

ii. Nylon web slings must not be used where fumes, vapors, sprays or mists or liquids of acids or phenolic are present. Web slings with aluminum fittings must apply in this category.

**iii. Synthetic web slings must be removed from service and destroyed if any of the following conditions are present:**

a. Acid or caustic burns
b. Melting or charring of any part of the sling surface
c. Snags, punctures, tears or cuts
d. Broken stitches
e. Distortion of fittings
f. Synthetic web slings of polyester or nylon must not be used at or come in contact with temperatures in excess of 82°C
g. Polypropylene web slings must not be used at or come in contact with temperatures in excess of 93°C
h. Insulated hooks must be tested yearly to ensure insulation integrity to at least manufacturer's specifications.

**p. Wire Rope Slings must be removed from service and destroyed if any of the following conditions are present:**

i. In (10) randomly distributed wires broken in one (1) rope lay, or five (5) broken wires in one (1) strand in one (1) rope lay.
ii. Wear or scraping of one-third the original diameter of outside wires.
iii. Kinking, crushing, bird caging or any other damage resulting in distortion of the wire rope structure such as:
iv. Evidence of heat damage.
v. End attachments that are cracked, deformed worn.
vi. Corrosion of the rope or end attachments.

**q. Metal mesh slings must be immediately removed from service if any of the following conditions are present:**

i. A broken weld or broken brazed joint along the sling edge.
ii. Reduction in wire diameter of 25 percent due to abrasion or 15 percent due to corrosion.
iii. Lack of flexibility due to distortion or corrosion.

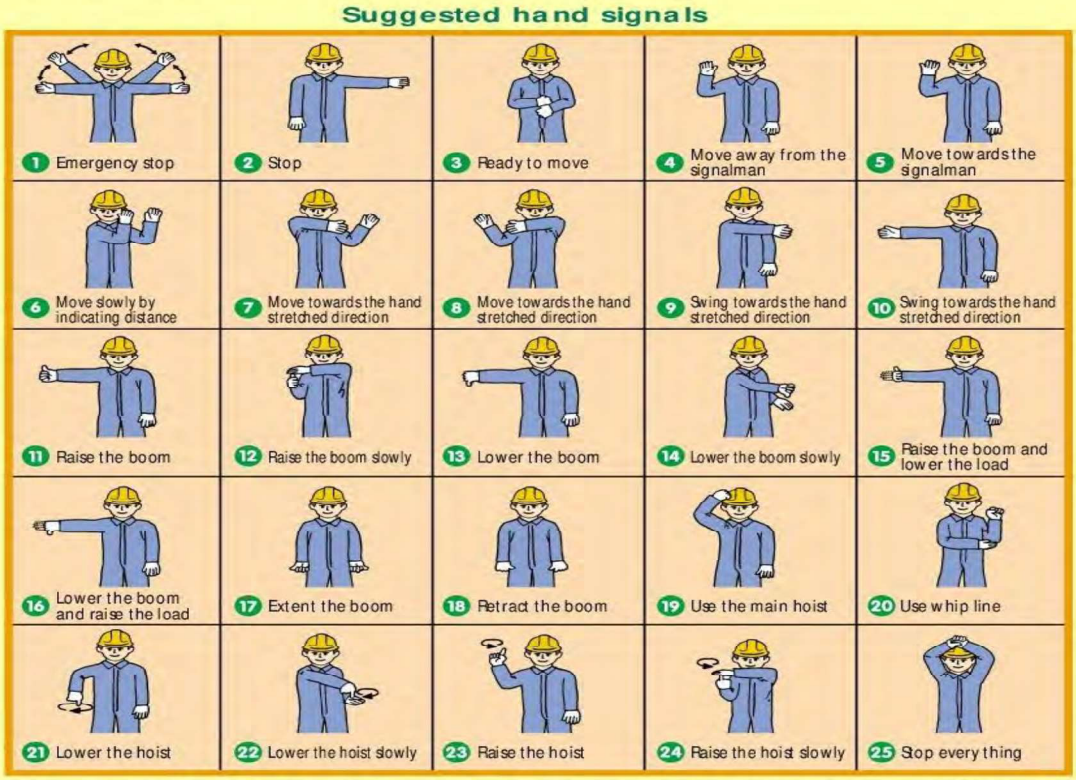
**r. Requirements of Plate Clamps:**

i. The rated load of the plate clamp must be marked on the main structure.

ii. Care must be taken to make certain the load is correctly distributed for the plate clamp being used.
iii. Do not allow load or plate clamp to come into contact with any obstruction.
iv. The plate clamp must not be used for side pulls or sliding the load.
v. When lifting stainless steel or special alloys, ensure plate clamp is designed for use on the specific metal.

**s. <u>Signaling Practices:</u>**

- The "slinger" is responsible for attaching and detaching the load to and from the crane. He shall:
  - have received appropriate training on general safe lifting operations;
  - be capable of selectings lifting gears suitable for the loads;
  - liaise with the operator and direct the movement of the crane safely.
- The "signaller" is responsible for relaying the signal from the slinger to the crane operator. He shall:
  - have received appropriate training on general safe lifting operations;
  - be able to direct the movement of the crane and loads.




**<u>Fig. 5.4 Recommended Signaling Practices</u>**

## 5. DEMOLITION WORK

Before any demolition work is commenced and also during the process of the work the following shall be ensured, besides using the Work Permit:

a. All roads and open areas adjacent to the work site shall either be closed, suitably protected or restricted for movement
b. No electric cable or apparatus which is liable to be a source of danger nor a cable or an apparatus used by the operator shall remain electrically charged.

c. All practical steps shall be taken to prevent danger to persons employed from the risks of fire or explosion or flooding. No floor, roof or other part of the building shall be so overloaded with debris or materials as to render them unsafe.

**6. T&PS GENERAL**

a. All T&Ps/ MMEs should be of reputed brand/appropriate quality & must have valid test /calibration certificates bearing endorsement from competent authority of BHEL.
b. Subcontractor to also submit monthly reports of T&Ps deployed and validity test certificates to BHEL safety Officer as per the format/procedure of BHEL.
c. Tagging and punching in all lifting tool is compulsory with SWL, sr. no. and due date.
d. All T&Ps shall be inspected by authorized Third Party agency as per applicable frequency. BHEL shall be kept informed of any such scheduled inspection
e. All T&Ps shall be internally inspected in each quarter and colour coded.

**7. CHEMICAL HANDLING**

a. Displaying safe handling procedures & MSDS for all chemicals such as lube oil, acid, alkali, sealing compounds etc. at work place.
b. Where it is necessary to provide and/or store petroleum products or petroleum mixture & explosives, the subcontractor shall be responsible for carrying out such provision / storage in accordance with the rules & regulations laid down in the relevant petroleum act, explosive act and petroleum and carbide of calcium manual, published by the chief inspector of explosives of India. All such storage shall have prior approval if necessary from the chief inspector of explosives or any other statutory authority. The subcontractor shall be responsible for obtaining the same.
c. The used containers of chemicals shall be segregated and disposed of suitably
d. In case the used containers need to be re-used, all traces of the chemical to be removed by thorough cleaning with detergents etc. under trained supervision

**8. ELECTRICAL SAFETY**

a. Only electricians licensed by appropriate statutory authority shall be employed by the subcontractor to carry out all types of electrical works. The subcontractor shall maintain adequate number of qualified electricians to maintain his temporary electrical installations.
b. No PDB or any other distribution board shall be more than 03 (three) years of purchase. Only modern PDB with industrial sockets as shown in layout below to be allowed to use at site.
c. Power supply to all equipment at site to be routed through MCBs of appropriate rating. A 'Power Supply Distribution Plan' shall be prepared and submitted to BHEL Engineer for approval
d. All power supplies through cables shall be underground or overhead with height > 3mtrs.
e. All power distribution boxes shall be locked and the key controlled by site management of concerned subcontractor.
f. All individual equipment & tools at site shall be powered through Earth Leakage Circuit Breakers of 30 mA sensitivity.
g. These MCBs and ELCBs shall be regularly tested as per Clause 14
h. All fuses and fuse wires shall be of standard size and rating.
i. All electrical appliances used in the work shall be in good working condition and shall be properly double earthed other that armour earthling.

j. All extension boards shall have separate switches for all sockets / connections.

k. All portable electric tools used by the subcontractor shall have safe plugging system (industrial top & socket) to source of power and be appropriately earthed.

l. Providing adequate no. of 24 V sources and ensure that no hand lamps are operating at voltage level above 24 Volts especially in confined spaces like inside water boxes, turbine casings, condensers etc.

m. Electrical appliance shall have proper earthing and for appliances equal to & more than 415V shall have two separate earthing (as per IS-3043-1987)

**n. Portable Electric Lights**

i. Portable electric lights used in wet or potentially wet locations must be either low voltage type (24 volts or less) or protected by a GFI (ground fault interrupter).

ii. They must be visually checked before each use and periodically while in use to assure their original integrity is maintained.

iii. Cords with cuts, breaks, deep abrasions, etc. shall be taken out of service immediately.

iv. Repairs to extension cords shall only be performed by qualified/ licensed electricians.

v. Must not be allowed to lie in wet or potentially wet areas.

**o. Underground Cables:**

i. Every electric line or cable of unknown origin that is discovered or exposed during a digging, drilling, probing, or similar operation is to be considered as energized and life threatening.

ii. The senior company employee on the site will ensure that all necessary safety precautions are taken in order to isolate the line from all workers and the public.

iii. Such precautions may include halting the operation if appropriate.

iv. The senior company employee on the site is to then contact the proper authorities to have the line identified and either confirmed to be abandoned and/or made safe for continuing the work.

v. Any and all underground lines that are discovered or become severed must be considered energized on both sides, and be treated accordingly.

p. Details of earth resource and their test date to be given to BHEL safety officer as per the prescribed formats of BHEL

q. The subcontractor shall use only properly insulated and armoured cables and conform to the requirement of Indian Electricity Act and Rules for all wiring, electrical applications at site.

r. BHEL reserves the right to replace any unsafe electrical installations, wiring, cabling etc. at the risk & cost of the subcontractor.

s. No maintenance work shall be carried out on live equipment

t. Adequate precautions shall be taken to prevent danger for electrical equipment. No materials on any of the sites of work shall be so stacked or placed as to cause danger or inconvenience to any person or the public

u. The subcontractor shall carefully follow the safety requirement of BHEL/ the purchaser with the regard to voltages used in critical areas.

v. Wiring and Branch Circuits Must be protected by a proper amperage over-current device such as a HRC fuse or circuit breaker. Such installations must be located so as to prevent physical damage to the wire conductors & panels.

w. The sub-contractor shall supply modern power distribution board of different combination (1-phase & 3-phase). All the distribution of power should be through modern PDB. Equipment drawing is mentioned below.

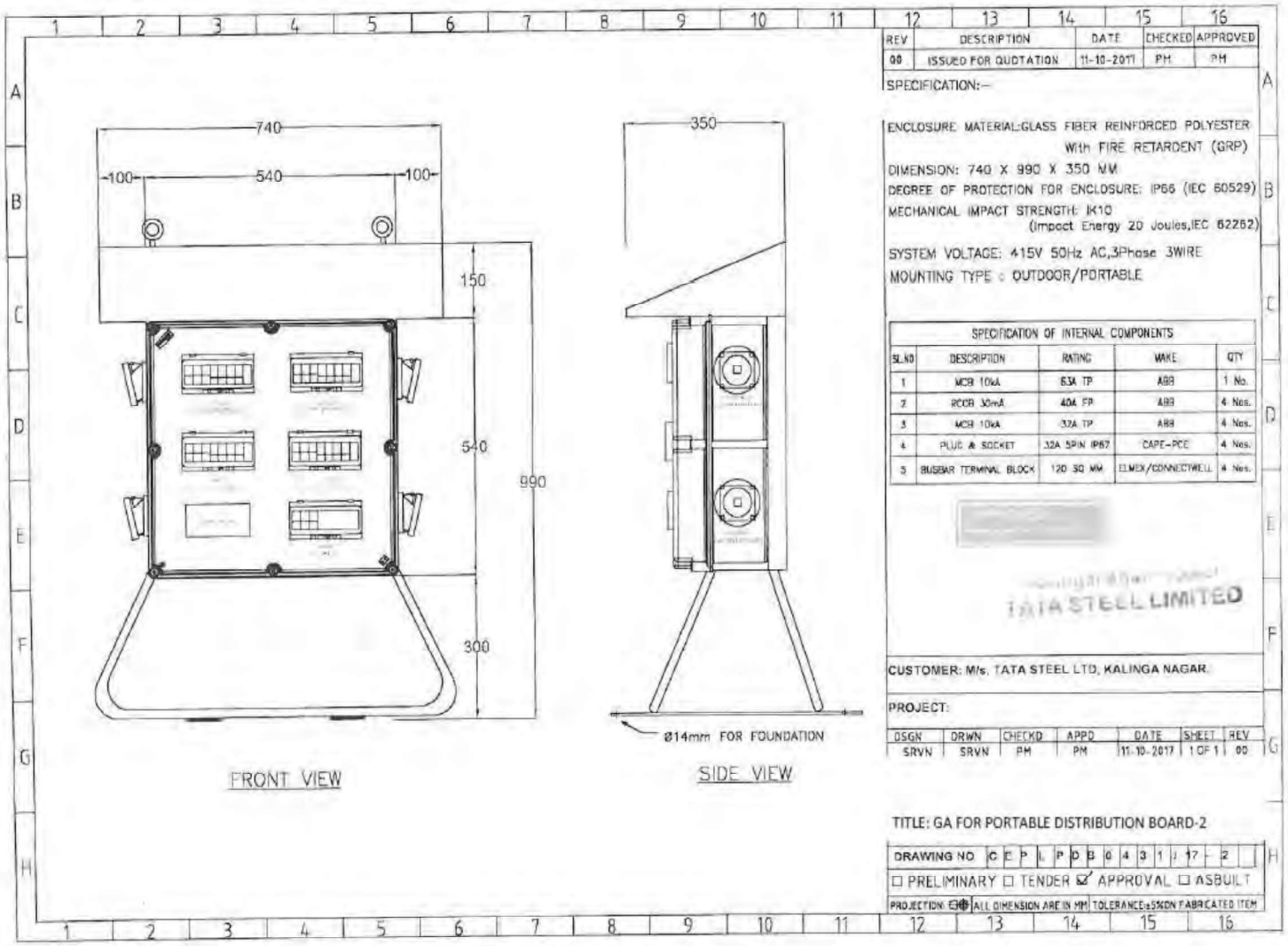



**Fig. 9.1 Layout of a modern Power Distribution Board**

**x. General Electrical Safety**

i. In general, equipment or machinery being moved or transported must maintain minimum clearances of 25 ft. to all power lines.

ii. TAG IN/ TAG OUT must be in force in Switch Room and all Distribution Boxes for live power line. The authorized person's name and contact no shall be displayed

iii. Ensure "double insulated" three - core cables and three pin connectors are used and are properly ground "all insulated" types, all electrical tools and appliances must be manufactured for industrial use.

iv. All connections shall be electrically and mechanically sound and properly insulated. Taped joints are not permitted. Connections to socket outlets must be made with proper plugs (industrial top and socket).

v. Splices in electrical cords are not permitted. Repairs must be made at the socket connection and retain the same mechanical and dielectric condition of the original connection.

vi. Damaged or defective electric tools, equipment and extension cords, etc. must not be used and shall be tagged out of service, removed from the work area and taken back to stores.

vii. Only licensed electricians are authorized to repair and work on electrical equipment. Tampering with electric tools or equipment by others could result in termination.

viii. Temporary electric cabling should be elevated 2.2 meters above the floor/ground or covered for protection. It must be kept clear of walkways and other locations where it may be exposed to damage or create a tripping hazard.

ix. Energized wiring in junction boxes, circuit breaker panels and similar places must be covered and locked at all times.

x. Areas with live high voltage wires or terminals must be barricaded against entry and warning signs posted Danger – High Voltage and Authorized Personnel Only.

xi. Personnel should never work on energized equipment, de-energizing (lockout/tag out) the equipment is always the first requirement.

xii. The lockout and tag out procedure will be used when testing or working on, or around, energized installation.

xiii. Working around energized equipment should never be done alone. A second electrician must always be available for assistance.

xiv. If lockout/tag out of the work is infeasible (must be demonstrated), work on energized electrical circuits must be approved by the Site In-charge. All safety precautions necessary must be taken, PPE use must be evaluated per the exposure and used, i.e high/low voltage gloves, insulated shoes, overcoats/aprons, face shields, and other protective equipment like insulated tools, blankets, mats, etc. must be used.

xv. The welding machines earth leads shall be properly fixed without loose contacts. The earth cable only has to be used. No steel members shall be used as earth leads.

xvi. Electrical crews must be qualified for the equipment and tools they work on, including being trained in Cardio-Pulmonary Resuscitation (CPR) methods and First Aid for rendering help in the event of electric shock.

**y. Qualified Persons for Electrical Works**

(One who is trained and wiremen licensed to Govt. of Respective State and familiar with the construction, operation and safety hazards of the equipment upon which they are permitted to work.)

i. Qualified persons are intended to be only those who are well acquainted/experienced with and thoroughly conversant in the electric equipment and electrical hazards involved with work being performed.

ii. Only qualified persons may be permitted to work on or near exposed energized parts. Such persons are required to have been trained in three specific areas:

iii. Qualified persons must be capable of working safely on energized circuits;

iv. Must be familiar with the proper use of special precautionary techniques and procedures bases on equipment and exposure; and

v. Must be familiar with required personal protective equipment, insulating and shielding materials, and insulated tools.

vi. Qualified persons are expected to be able to evaluate unknown situations and adjust their activities in such a way that only safe work practices are used. Such behavior is the responsibility of the qualified person.

vii. It is possible and likely for an individual to be 'qualified' with regard to certain equipment in the work place, and unqualified on other equipment they must know their limitation and stop work if not qualified on what equipment they were to work on.

viii. An employee who is undergoing on-the-job training, who, in the course of such training, has demonstrated an ability to perform duties safely at his or her level of training, and who is under the direct supervision of a qualified person is considered to be a qualified person for the performance of those duties. The process must be documented as proof.

**z. Mandatory PPEs of electrical work on LV & HV**

i. HV arc flash suit with protective hood (for protection of face and head) as specified for hazard risk category-4 in NFPA-70E or similar IS specification for working on HT switch gear (for all voltage >690 V) to the concerned licensed electrician or competent person.

ii. LV arc flash jacket/FR as specified for hazard risk category-4 in NFPA-70E or similar IS specification having ATPV rating of 8.5 to 9 cal/cm2 for working on LV (>260V and <=690V) to the concerned licensed electrician or competent person.



iii. The LV arc flash jacket as shown above shall be worn continuously while working on LV (>260V and <=690V). The color specification of LV arc flash jacket should be blue.

iv. Electrical hand gloves should have following specification: Flame resistance, arc flash and cut protection of voltage rating (>260V and <=690V).

v. Electrical safety over shoe of relevant IS make for foot protection of licensed electrician or competent person while working in HV & LV line or equipment.

## 9. USE OF HAND TOOLS AND POWER-OPERATED TOOLS

### a. General Provisions

i. All hands and power tools and similar equipment, shall be maintained in safe condition.

ii. When power operated tools are designed to accommodate guards, they shall be equipped

iii. with such guards, when in use;

iv. Belts, gears, shafts, pulleys, sprockets, spindles, drums, fly wheels, chains and other reciprocating, rotating or moving parts of the equipment shall be similarly guarded;

v. Personnel using hand and power tools and exposed to the hazard of falling, flying, abrasive, and splashing objects, or exposed to harmful dusts, fumes, mists, vapors, or gases shall be provided with the particular personal protective equipment necessary to protect them from the hazards;

vi. All hand-held powered platen sanders, grinders, grinders with wheels of 5 cm or less, routers, planers, laminate trimmers, nibblers, shears, scroll saws and jigsaws with blade shanks of 0.5 cm wide or less shall be equipped with only a positive on-off control.

vii. All hand-held powered drills, tappers, fastener drivers, horizontal, vertical or angle grinders with wheels greater than 5 cm in diameter, disc sanders, belt sanders, reciprocating saws, saber saws and other operating powered tools shall be equipped with a momentary contact on control provided that turnoff can be accomplished by a single motion of the same finger or fingers that turn it on.

**b. Hand Tools**

i. The subcontractor shall not issue or permit the use of unsafe hand tools;

ii. Wrenches including adjustable pipe end and socket wrenches shall not be used when saws are sprung to the point that slippage occurs;

iii. Impact tools such as drift pins, wedges and chisels shall be kept free of mushroomed heads;

iv. The wooden handles of tools shall be kept free of splinters or cracks and shall be kept tight on the tools.

**c. Power Operated Tools**

i. Electric power operated tools shall be either of the approved double-insulated type or shall be grounded;

ii. The use of electric cords for hoisting or lowering loads shall not be permitted;

iii. Pneumatic power tools shall be secured to the hose or whip by some positive means to prevent the tool from becoming incidentally disconnected;

iv. Safety clips or retainers shall be securely installed or maintained on pneumatic impact (percussion) tools to prevent attachments from being incidentally expelled;

v. All pneumatically riveting machine staplers and other similar equipment provided with automatic fastener feed, which operate at more than 7 kg/cm2 pressure at the tool a safety device on the muzzle to prevent the tool from ejecting the fasteners unless the muzzle is in contact with the work surface;

vi. Compressed air shall not be used for cleaning purposes except when the pressure is reduced to less than 2 kg/cm2 and that too with effective chip guarding. The 2 kg/cm2 pressure requirement does not apply to concrete form, mill scale and similar cleaning purposes;

vii. The manufacturer's safe operating for hoses, pipes, valves, filters and other fittings shall not be exceeded;

viii. Only personnel who has been trained in the operation of the particular tool shall be allowed to operate power-actuated tools;

ix. The tool shall be tested each day before loading to see that the safety devices are in proper working condition. The method of testing shall be accordance with the manufacturer's recommended procedure;

x. Any tool found not in proper working order, or that which develops a defect during use, shall be immediately removed from service and not used until properly repaired;

xi. Tools shall not be loaded until just prior to the intended firing time. Neither loaded nor empty tools are to be pointed at any other person. Hands shall be kept clear of the open barrel end;

xii. Loaded tools shall not be left unattended;

xiii. Fasteners shall not be driven into very hard or brittle materials including, but not limited to, cast iron, glazed tiles, surface hardened steel, glass block, live rock, face brick or hollow tiles;

xiv. Driving into materials that can be easily penetrated shall be avoided unless backed by a
xv. substance that will prevent the pin or fastener from passing completely through and creating a flying missile hazard on the other side;
xvi. No fastener shall be driven into a palled area caused by an unsatisfactory fastening;
xvii. Only non-sparking tools shall be used in an explosive or flammable atmosphere;
xviii. All tools shall be used with the correct shield, guard or attachment as recommended by the manufacturer.

**d. Abrasive Wheels and Tools**

i. All grinding wheel must be ISO certified only.
ii. All grinding machines shall be supplied with sufficient power to maintain the spindle speed at safe levels under all conditions of normal operation;
iii. Grinding machines shall be equipped with suitable safety guards;
iv. The maximum angular exposure of the grinding wheel periphery and sides shall not be more than 900, except that when the work requires contact with the wheel below the horizontal plane of the spindle, the angular exposure shall not exceed 1200. In either case, the exposure shall begin not more than 8.650 above the horizontal plane of the spindle. Safety guards shall be strong enough to withstand the bursting of the wheel;
v. Floor and bench-mounted grinders shall be work-rests, which shall be rigidly supported and readily adjustable. Such work-rests shall be kept at a distance not to exceed 5 mm from the surface of the wheel;
vi. Cup type wheels used for external grinding shall be protected by either revolving cup guard or a band type guard;
vii. When safety guards are required, they shall be mounted as to maintain proper alignment with the wheel and the guard and the guard and its fastening shall be adequate strength to retain the fragments of the wheel in case of incidental breakage. The maximum angular exposure of the grinding wheel periphery and sides shall not exceed 1800;
viii. Portable abrasive wheel used for internal grinding shall be provided with suitable safety flanges;
ix. When safety flanges are required, they shall be used only with wheels designed to fit the flanges. Only safety flanges, of a type and design and properly assembled so as to ensure that the pieces of the wheel will be retained in case of incidental breakage, shall be used;
x. All abrasive wheels shall be closely inspected and ring tested before mounting to ensure that they are free from cracks or defects;
xi. Grinding wheels shall fit freely on the spindle and shall not be forced on. The spindle nut shall be tightened only enough to hold the wheel in place;
xii. All employees using abrasive wheels shall be protected by suitable eye protection equipment.

**e. Wood Working Tools**

i. All fixed power-driven woodworking tools shall be provided with a disconnect switch that can either be locked or tagged in the off-position;
ii. The operating speed shall be attached or otherwise permanently marked on all circular saws over 0.5 m in diameter or operating at over 3000 peripheral rpm. Any saw so marked shall not be operated at a speed other than that marked on the blade. When a marked saw is re-tensioned for a different speed,

the marking shall be corrected to show the new speed;

iii. Automatic feeding devices shall be installed on machines wherever the nature of the work will permit. Feeder attachments shall have the feed rolls or other moving parts covered or guarded so as to protect the operator from hazardous points;

iv. All portable power-driven circular saws shall be equipped with guards above and below the base plate or shoe. The upper guard shall cover the saw to the depth of the teeth, except for the minimum arc required to permit the base to be tilted for bevel cuts. The lower guard shall cover the saw to the depth of the teeth, except for the minimum arc required to allow proper retraction and contact with the work. When the tool is withdrawn from the work, the lower guard shall automatically and instantly return to the covering position.

**10. START UP, COMMISSIONING AND TESTING:**

There are various activities involved prior to commissioning- the major ones are -Hydraulic Test, Steam Blowing, Transformers Charging, Boiler Light Up, Rolling and Synchronisation and Full loading of unit.

a. These activities shall be personally supervised by the site executive along with the commissioning engineer.
b. Appropriate Work Permits shall be taken as applicable
c. The readiness of upstream and downstream system shall be ensured before taking up.
d. These shall be handled strictly by the authorized persons only and the team shall be suitably briefed about the activity including hazards & risks involved and control plan by the concerned executive-in-charge before start.
e. Entry of persons to the area of activity shall be suitably restricted and the emergency functions like Ambulance, first aid center and Fire station shall be intimated about the plan well in advance.
f. Tag-in/ Tag-out shall be in place while charging transformer and whenever necessary.
g. Electricians with valid wiremen license only shall be permitted to work on power lines.
h. The area and the passage shall be adequately illuminated.

**11. FIRE SAFETY**

a. The Fire Prevention, Protection and Preparedness Program is an integral part of the overall HSE Program. Effort and consideration must be given to safety, life and potential for delays in construction schedules and plant startup, as well as protection of property on a given project. The purpose of which is to prevent
    i. Inception of fire
    ii. Loss of life or personal injury
    iii. Loss of Property
    iv. Interruption of operations
b. Site-in-charge / Safety Officer will make periodical review of the site Fire Protection, Prevention Preparedness Programme, Site conditions and available fire protection equipment. It is very imperative that the Sub-contractors along with BHEL to establish good contact with Local fire station for availability of Fire tender in case of emergencies, in additional to their own fire equipment.
c. Fire Protection, Prevention and Preparedness Inspections - The Contractor /Sub-Contractor will be required to make frequent fire prevention inspections of his work site and operating facilities.
   Deficiencies will be corrected at once.
d. Area where Hot work activities are carried out (Gas cutting / Welding/ any other spark producing work)

above a working spot, a GI / fire-resistant non-asbestos sheet or suitable material shall be placed to prevent the fall of hot sparks. A bucket of water shall be kept nearby while doing hot work

e. Hot work shall be preferably carried out in a designated area with a standing Hot Work Permit, to be renewed monthly. The designated area shall have fire extinguishers.

f. Any hot work outside designated area shall require a Hot Work permit and fire watch. No flammable material shall be stored within 35 feet from any fire load.

**12. PAINTING:**

a. Requirements provide a detailed procedure to be implemented by all concerned employees and sub-contractors involved in painting activities.

b. Significant Environmental Hazards:
   i. Chemical hazard due to inhalation of lead fumes (lead containing paint)
   ii. Chemical hazard due to inhalation of VOC's from paining operations
   iii. VOC's from painting and coating operation
   iv. Disposal of paints and coats drums

c. Control Procedure for Paining:
   i. Chemical products used in painting and coating operation shall have proper MSDS sheet in place. Whenever any doubt arises with respect to handling and safety point of view it should be accessed to all concerned.
   ii. Toxic substances and hazards relate the toxic chemicals shall be identified.
   iii. Proper PPE shall be used including plastic gloves appropriate overall etc.,
   iv. Arrangement for cleaning of spillage shall be ensured

d. Only trained workers shall be allowed and proper training should be imparted to the works.

e. Exposure limits of the toxic substances shall be checked before starting the work and nobody shall be allowed to carry the work beyond the permissible limit.

f. Ventilation or exhaust facility shall be provided at place where painting and coating operations are carried out.

g. Overalls shall be supplied by the contractors/subcontractors to the workmen and adequate facilities shall be provided to enable the painters to wash at the cessation of work.

h. Smoking, open flames or sources of ignition shall not be allowed in places where paints and other flammable substances are stored.

i. A caution board in national /regional language "**smoking strictly prohibited**" shall be displayed in the vicinity.

j. Suitable fire extinguishers/sand buckets shall be kept available at places where flammable paints are stored, handled or used.

k. In case of indoor painting or painting in confined spaces, exhaust ventilating shall be provided. If adequate ventilation is not provided a proper respirator shall be provided and used by persons who are trained and fit tested.

l. The VOC's from painting and coating operations shall not exceed the permissible level of CPCB/ SPCB norms. The paints and coats must be selected as per the guidelines.

m. Workers shall thoroughly wash their hands and feet before leaving the work.

## 13. "HAZARDOUS ENERGY" CONTROL PROCEDURE/ LOCKOUT/TAGOUT (LOTO)

Hazardous Energy Control Procedures, known as "Lockout/Tagout (LOTO)" refers to specific practices and procedures to safeguard employees from the unexpected energization or startup of machinery and equipment, or the release of hazardous energy during service or maintenance activities.

Contractors must develop and submit a written LOTO program This requires that a designated qualified individual turns off and disconnects the machinery or equipment from its energy source(s) before performing service or maintenance and that the authorized employee(s) either lock and tag the energy- isolating device(s) to prevent the release of hazardous energy and test the machine or equipment to verify that the energy has been isolated effectively.

**a. Minimum Requirements:**

The following are minimum requirements that must be included in the Contractor's LOTO program:

i. Inspection of equipment by a trained individual who is thoroughly familiar with the equipment operation and associated hazards.
ii. Identification and labeling of lockout devices. Purchase of locks, tags, and blocks Development of a standard written operating procedure, permitted through a controlling authority that is followed by all workers.

**b. General Requirements**

The following steps must be taken to protect workers that install or service equipment and systems:

Follow the hazardous energy procedures and statutory regulations. Follow the manufacturer's service/repair instructions. Identify and label all sources of hazardous energy. Before beginning work, accomplish the following:

i. De-energize all sources of hazardous energy:
ii. Disconnect or shut down engines or motors.
iii. De-energize electrical circuits.
iv. Block fluid (gas or liquid) flow in hydraulic or pneumatic systems.
v. Block or secure machine parts against motion.
vi. Block or dissipate stored energy.
vii. Discharge capacitors.
viii. Release or block springs that are under compression or tension.
ix. Vent fluids from pressure vessels, tanks, or accumulators—but never vent toxic, flammable, or explosive substances directly into the atmosphere

c. Lockout and tag out all forms of hazardous energy including electrical breaker panels, control valves, etc. Make sure that only one key exists for each of your assigned locks and that access to the key is controlled. Verify by test and/or observation that all energy sources are de- energized.

d. After completion of the work, accomplish the following:

i. Inspect repair work before removing the lock and activating the equipment.
ii. Make sure that only the worker that installed the lock removes his/her assigned lock.
iii. Make sure that all workers are clear of danger points before re-energizing the system.

**e. LOTO Procedure**

**PURPOSE AND SUMMARY**

This procedure provides the requirements and responsibilities of Hazardous Energy Control and the process for Lockout / Tag out (LOTO) of energy isolating devices (valves, circuit breakers, disconnect, etc.). Its use

shall ensure that machinery, equipment, or systems are isolated from all potentially hazardous energy to prevent unexpected energization, startup, or release of stored energy which may cause personnel injury or property damage.

This procedure applies to all BHEL personnel and subcontractors working on the WBPDCL (1X660MW) STAGE-III projects where equipment must be taken out of service for the performance of work activities such as installation, maintenance, repair, construction, or equipment removal. The procedure may also be used to isolate equipment of which the energization or operation may present danger to personnel or property.

Lockout / tag out are not required for electrical equipment that can be unplugged from the source and the person performing the work has control of the plug.

This procedure shall be applied to prevent injury or damage caused by the unexpected release of active or stored energy. Hazardous energy sources could be in the form of the following:

- Electrical
- Hydraulic
- Chemical
- Thermal
- Mechanical
- Pneumatic

Preplanning of work activities includes the identification of all potential hazardous energy sources so that they may be properly controlled and isolated, locked, and tagged out.

Prior to initiating work activities on or around locked out / tagged out equipment, the equipment must be tested and tried by or in the presence of the person(s) performing the work activities.

**RESPONSIBILITIES**

- The Engineers in Charge is responsible for implementing and enforcing this procedure and approving lockouts /tag outs that impact the operation of the project.
- The Engineer in Charges responsible for authorizing Lockout /Tag out Requests.
- The Lockout / Tag out Coordinator is responsible for maintaining the Lockout / Tag out Log. Each shift should have a designated Lockout / Tag out Coordinator.
- The Isolator is responsible for determining the proper isolation devices and device positions required to isolate all potential energy sources so that the work stated on the Lockout /Tag out Request Permit may be safely performed. The Isolator must be familiar with the equipment and energy type(s) that require isolation. For this reason, in some cases the Isolator may be more than one person (i.e. Engineer, System Operator and/or Electrician). The Isolator shall position the specified device points, and apply locks and tags, and sign the tags and the LOTO Permit isolation point blocks.
- The Safety Manager is responsible for conducting an annual audit that is documented to ensure all procedures and requirements are current and being followed as written.

**DEFINITIONS**

**Affected Employee: -**

An employee whose job requires him/her to operate or use machinery or equipment on which servicing or maintenance is being performed under a lock out/tag out procedure or whose job requires him/her to work in an area in which servicing or maintenance is being performed under a lockout/tag out procedure

**Authorized Employee: -**

An employee who implements a lockout/tag out procedure on machinery, equipment, or systems in order that servicing or maintenance may be performed. Often an authorized employee and an affected employee may be the same person.

**Danger "Do Not Operate" Tag**

A tag used to identify energy isolation devices and specify the required position of the device. The tag should be affixed to the isolation device such that it is in plain view of anyone attempting to operate the device. The tags shall be sequentially numbered and shall specify the lockout/ tag out request number. The tag shall also state the purpose, and the expected duration of the lockout /tag out

**Isolation Device**

A device that is designed and intended to prevent the passage of energy. These devices, usually located at the energy source, are typically valves, circuit breakers, etc. Isolation devices should have a means of being locked in position

**Lockout Device**

A device that uses a positive physical means such as a lock, either key or combination type to maintain an energy isolation device in the safe position and prevent the in advertent energization of machinery, equipment, or systems. Device locks should serve no other purpose other than hazardous energy control isolation

**Lockout Tag out Request Permit**

A pre-numbered form used to request that machinery, equipment or systems be taken out of service. A Lockout/Tagout Request Permit may be initiated by any one requiring energy isolation for work activities or for taking faulty equipment out of service

**Lockout / Tag out Request Log**

A record of all Lockout /Tag out Request Permits shall be maintained by the Lockout /Tag out Coordinator.

**PROCEDURE**

**1. REQUESTING A LOCKOUT / TAGOUT PERMIT**

When machinery, equipment, or systems are partially or completely taken out of service for work activities or equipment protection, a lockout / tag out shall be requested. The requestor shall be familiar with scope of work required and shall provide a brief description of the work on the Lockout / Tag out Request Permit. The requestor shall also provide the proposed start time and estimated duration of lockout / tag out. If familiar with the machinery, equipment, or system to be taken out of service, the requestor may identify the devices that are required to be isolated. The LOTO Request Permit shall be forwarded to the Authorized Lockout / Tag out Coordinator for reviewed and signature, along with Permit to Work number to be entered on the LOTO Request Permit.

a. The Lockout / Tag out Coordinator shall record the necessary information on the Lockout / Tag out Request Log and forward the request to the Engineer in Charge for approval.
b. The Safety Manager or Engineer in Charge shall review the Lockout / Tagout Request Permit for impact on project operations. Project operations could be impacted by the equipment being taken out of service or by the required isolation to take the equipment out of service. If project operations are impacted by the Lockout / Tagout, the request shall be forwarded to the Engineer in Charge for approval.
c. The Engineer in Charge shall provide the lockout / tag out isolation points necessary to perform the task stated on the request. The device identification, device location, device position, and locking mechanism

shall be entered into the appropriate blocks on the Lockout / Tag out Request Permit.

d. The Engineer in Charge indicates approval of the Lockout / Tagout Request Permit by signing in the appropriate space on the request. If the Lockout /Tag out Request Permit is rejected, the Engineer in Charge shall return it to the requestor, via the Lockout / Tagout Coordinator with a written explanation of the rejection.
e. Once approved, the Lockout / Tag out Request Permit shall be forwarded to the Lockout / Tag out Coordinator to assign tags and locks.
f. The log shall show current status of all Lockout / Tag out Request Permits from submittal to approval, through lifting of locks and tags to final closeout. The log shall be maintained by the Lockout / Tag out Coordinator in their office.

**2. PLACEMENT OF LOCKS AND TAGS**

a. The tags shall be filled out to match the information on the LOTO Request Permit. Appropriate locks for the types of isolation devices specified shall be collected and placed with the tags and the Lockout / Tag out Request Permit.
b. The isolator(s) shall take the device locks, tags, and the Lockout / Tagout Request Permit to position the specified isolation devices, sign and hang the tags, and place the locks. If the isolator does not agree with or understand the Lockout / Tagout Request Permit, or has a problem performing the isolation, the problem should be brought to the attention of the Safety Representative or Area Supervisor immediately and the lockout / tag out should be postponed until the situation is resolved.
c. Once the Isolator has placed all “locks” on isolation points, they will “test ”and “try” the machinery, equipment, or system to ensure all hazardous energy has been completely removed and the isolation is one totally accomplished, and has initialed and signed the Lockout /Tag out Request Permit indicating all isolation points have been confirmed. Examples of “lock”, “test” and “try”:
    - by checking that all locks on the LOTO Request Permit have been applied and are in the specified position open/closed, on/off, etc.; metering test of electrical circuits, opening of drain valves, checking pressure gauges or indicators; and try by pushing start buttons and on/off switches, etc.
    - Testing shall be performed by person(s) knowledgeable of the energy source(s) being isolated (e.g., an electrician should meter electrical circuits).
d. A copy of the completed Lockout /Tag out Request Permit shall remain with the Work Package and used as part of the daily Pre-Job Briefings

**3. WORKING UNDER A LOCKOUT / TAGOUT REQUEST**

a. Prior to starting the work activity, the person(s) performing the work shall review the Lockout / Tag out Request Permit and place the necessary tags and personal locks on the identified isolation devices. Personal locks may be placed only on devices that have already been locked and tagged in accordance with the Lockout / Tag out Request Permit.

- All personal locks shall be accompanied by a tag that is signed and dated by the worker(s) and specifies the work activity being performed.
- Personal locks should be of a different color than device locks for ready identification.

b. Verification of the effectiveness of the isolation by the Isolator shall be performed for Worker’s working under the lockout / tag out, by demonstrating the checks on “lock”, “test” and “try”,
c. When the work activity is finished, personal locks and tags shall be removed and the Safety Representative

shall be notified that the Lockout / Tagout is no longer required. If work under a lockout / tag out is to be delayed or interrupted for a period in excess of 24 hours, personal locks shall be removed until the work restarts. Personal locks shall be removed prior to the worker(s) leaving the project at the end of shift unless the key(s) are maintained at the project.

**4. REMOVAL OF LOCKS AND TAGS**

a. When the lockout / tag out is no longer required, the Safety Representative or Area Supervisor shall obtain the Lockout / Tagout Request Permit from the work package for LOTO removal. Prior to removing locks or tags that may allow equipment to be energized, a check shall be made to verify that the equipment is free to safely operate (i.e., will not cause damage or injury). The locks and tags shall be removed and returned to the Lockout / Tagout Coordinator. Isolation devices may be repositioned at the discretion of the Engineer in Charge according to operational requirements. The Isolator shall complete the Lockout / Tagout Request Permit indicating each lock and tag has been removed and the Safety Representative or Area Supervisor forward to the Lockout / Tagout Coordinator.

b. The Lockout / Tagout Coordinator shall discard the tags and maintain the completed Lockout / Tagout Request Permit for future reference.

c. In the event that an employee leaves the job site without removing the personal lock I tag, the following measures shall be taken and documented. The measures listed below are a minimum set of guidelines and under all circumstances, refer to the site-specific safe work plan for detailed procedures:

- Attempt calling / contacting the employee to return to the site for removal.
- In the event an employee cannot be contacted, the Site Manager and Safety Manager shall sign an Emergency Lockout/Tagout Removal Form, which has been completed by the Area Supervisor.
- Employee shall be notified upon returning to the site, prior to beginning any work.

**5. INTERRUPTION OF A LOCKOUT / TAGOUT**

**Operational Emergency**

The Engineer in Charge / Safety Manager /Area Supervisor may deem it necessary to temporarily remove the locks and tags from isolation devices, prior to the end of the work activity. The standard procedure for removal of locks and tags shall be followed. Extreme caution shall be taken by the Isolator removing the locks and tags to prevent personnel injury.

**Testing**

When the performance of a work activity requires the functional testing of a machine, component, or system, the locks and tags may be temporarily removed in accordance with the tag removal, to perform the test. As a result of the testing, if it is determined that the equipment needs further work, the locks and tags shall be positioned back on to the device. If it is not necessary to replace all the locks and tags, then the unnecessary locks and tags may be returned to the Lockout / Tagout Coordinator. The Engineer in Charge shall initial the Lockout / Tag out Request Permit in the removal block to indicate that these locks and tags have been removed. When testing has been satisfactorily completed, the locks and tags shall be removed.

**ISOLATION DEVICES**

- In most industrial applications, there are isolation devices that were not designed to accommodate a locking device. In these instances, an acceptable alternative that physically obstructs or prevents the use of the isolation device shall be found. Chains shall be placed on valves or electrical panels. Wires shall be determinate, pulled back, taped, and secured.

- If an isolation device does not accept a lock, a tag only is acceptable; however, all possible precautions shall be undertaken to provide a level of safety for the workers. The tag shall be readily visible to anyone attempting to operate the device.
- If more than one Lockout / Tagout Request Permit requires that a single isolation device be locked and tagged, a lock and tag for each request shall be placed. Each lock in itself prevents the inadvertent operation of the device.

**GROUP / COMPLEX LOCKOUT**

In a multiple lockout / tag out procedure, each person working on the machinery or equipment must place a lock or tag on the energy isolating device. If the energy isolating device will not accept multiple locks or tags, a hasp (a multiple lockout device, may be used. The locks or tags must be placed in such a way that energy cannot be restored to the machinery or equipment until every lock or tag is removed. As each employee involved no longer needs to maintain lockout / tag out protection that employee removes his - her lock and/or tag. The employee attaching the lock or tag is the only person authorized to remove the lock or tag.

**6. TRAINING**

The training must include recognition of hazardous energy source, type and magnitude of energy available, methods and means necessary for energy isolation and control. Each authorized employee shall receive adequate training. The training should address that all affected employees are instructed in the purpose and use of the energy control procedure. There should be training provisions included for any other employee whose work operations are or may be in an area where energy control procedures may be utilized. The employee training should also address when tag out systems are used including the limitations of a tag (tags are warning devices and do not provide physical restraint). The training should also include that a tag is not to be removed without authorization. The tag is never to be ignored or defeated in any way. Retraining is required when there is a change in job assignments, in machines, a change in the energy control procedures, or a new hazard is introduced. All training and I or retraining must be documented with employee's name and dates of training.

**7. PROGRAM REVIEW**

The lockout / tag out program must be reviewed at least annually. The review must ensure that procedures are being followed and that they are effective. A documented review of the inspection must include the date, the equipment, employees involved & the inspector. The inspector must be someone other than those actually using the lockout / tag out in progress.

**ATTACHMENTS**

#1. Danger (DO NOT OPERATE) Tags

#2. Device & Personal Locks and Multi Lock Hasp:


#3. Lockout / Tagout Request Permit

| | | |
|---|---|---|
| BHEL | **LOCKOUT / TAGOUT REQUEST PERMIT** | LOTO Request Permit No.: |
| | | Work Permit No.: |
| Equip. Out of Service: | LOTO Date Required by: _____/_____/_____ | Estimated Duration: |
| | | **LOTO Requested** Date: |
| Scope of Work: | | **LOTO Authorization** Signed by: |
| | | Date: |
| | | **LOTO Removal Authorization** Signed by: |
| | | Date: Time: |

| Tag No. | Device to be Tagged / Locked I.D. No. | Device Location | Device Position *OPEN / CLOSED* | Lock No. | Tag/Lock Placed by Print/Sign - Date/Time | | Tag /Lock Removed by Print/Sign - Date/Time | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

Comments Instructions: **Attachment 3.Lockout / Tag out Request Permit:**

#4. Lockout / Tag out Request Log

| LOTO Permit No. | Requestor Name | Equipment & Location | Est. Work Completed Date | Approval Date | LOTO Placed Date | LOTO Removed Date | Comments |
|---|---|---|---|---|---|---|---|
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

## 14. RISK ASSESSMENT

**Risk and Hazard Analysis**

In order to produce an overall Project EHS Plan, a project must be assessed for its risks. There are two components to the risk and hazard analysis. The procedure used to examine and plan for the identified risks and hazards is called a General Hazard and Risk Assessment.

**JSA/HIRA review**

Prior to commence the following activities Method statement and JSA/HIRA to be prepared by the concern engineer in coordination with EHS officer and submit to the client for review and approval. After getting approval the work will be started under PTW after clearance. For HIRA and criteria for the defining the high, medium & low risk the relevant annexure be referred. In case any deviations required in the approved method statement the concerned engineer/supervisor has to prepare additional HIRA/JSA to cover the new activities and associated risk. Following activities to be covered,

- Deep excavation (more than 5 feet)
- Significant concrete pouring (like heavy foundation, TG deck, Slab casting etc.)
- Confined entry
- Blasting
- Working on electrical/ energized equipment's
- Steel erection more than 5-Ton weight
- Working at height prior to completion of stairs/ladders/hand railing etc.

**Definition:**

**HAZARD** - Any potential or present danger to persons or property within the project site, e.g., oil on the floor is a hazard.

**INCIDENT -** An unintended happening that may result in injury, loss or damage, e.g., Slipping on the oil is an Incident.

**INJURY –** Physical harm, the result of an Incident, e.g., a sprained wrist from the fall would be an injury.

**Hazard Analysis Document**

- For high risk and dangerous work identified, the Applicant shall complete and submit a Hazard Analysis Document together with the PTW request. It will be a JSA (Job Safety Analysis) or Preliminary Hazard Analysis Checklist. And it shall be reviewed and approved by respective Construction and HSE Representatives.
- Issues such as work interface, coordination, drawings, toolbox meetings and work type/duration shall be detailed and included with supporting documentation for the Applicant's request for PTW.
- If applicable, Hazard Analysis Document shall be used as the foundation for development of Safe Work Method Statement. Each hazard identified shall be addressed in the Safe Work Method Statement and be submitted as part of the Applicant's submittal package.

**Evaluation of Sub-contractor Risk Assessments includes**

- Experience and expertise in performing similar type work.
- Duration of work performed
- Location of the work to be performed.

- Nature of the work to be performed.
- Potential for a subcontractor performing the work to expose themselves, other persons or employees, to hazards.
- Potential for exposure to work site hazards.

**Review of Subcontractor specific issues**

Preventive and protective measures must be introduced according to the following order of priority

- Eliminating the hazard by removing the activity from the work process. Examples include substitution with less hazardous chemicals, using different manufacturing processes, etc.
- Controlling the hazard at its source through use of engineering controls. Examples include local exhaust ventilation, isolation rooms, machine guarding, acoustic insulating, etc.
- Minimizing the hazard through design of safe work systems and administrative or institutional control measures. Examples include job rotation, training safe work procedures, lock-out and tag-out, workplace monitoring, limiting exposure or work duration, etc.
- Providing appropriate personal protective equipment (PPE) in conjunction with training, use, and maintenance of the PPE.

## 15. HSE PREPAREDNESS FOR ADVERSE CLIMATES AND WEATHER

All Preventive and Precautionary measures to ensure Health & Safety of workers in all possible adverse weather conditions based on the analysis of the local area conditions to be taken by the subcontractor

### 15.1 SUMMER

1. The Working Time and Lunch Hour will be as per instruction of Statutory Authorities (no work between 11am to 3:30pm). However, in case temp comes down due to rain/cloudy weather work will continue as per normal routine.
2. During long lunch break, worker will be allowed to go back home for rest. Those who will like to stay back will avail at the facility of rest shed or other designed area.
3. They will be allowed to take small break during work as per their need.
4. Water sprinkling will be done on roads to reduce dust concentration.
5. Workers will be provided with adequate cool drinking water and Butter milk/Lemon water etc.
6. Adequate ORS stock will be made available at the work location in the First-Aid Box for use as needed and at First-aid Centre for emergency need.
7. Fire prevention shall be on high alert, with removal of dry grass and bushes, etc, inside and outside the surrounding work areas. No smoking, and control of open flame/sparks shall be maintained and monitored.
8. Worker will be informed about the Do's and Don'ts to be followed during summer in the Pre Job Brief.

**Dos & Don'ts**

1. Drink plenty of cool water and other non-alcoholic fluid and keep body well hydrated.
2. Eat salt in food to replenish loss of salt through sweating.
3. Avoid over physical exercise.
4. Have adequate sleep at night.
5. Eat light and less spicy food
6. Avoid eating food which was cooked long time ago.

7. Nobody should use small water bodies such as pits, running rain water through crevices etc. for drinking and cleaning purpose as it may be unhygienic.

**Emergency Handling**

In case of emergency due to heat disorder:

1. Rescue the victim from workplace and place under shed.
2. If to be rescued from height, use stoke basket or rescue kit.
3. Inform Ambulance immediately.
4. If nearby any air conditioned room/shed is available, place him inside the room/shed.
5. Administer First aid by trained First aider for Heat Disorder
6. If conscious, give him ORS solution to drink.
7. If required send the victim hospital immediately.

## 15.2 MONSOON

**A. Height Work & Structural Safety:**

1. Ensure that all height work platforms are barricaded and avoid any highly hazardous
2. Height work.
3. Ensure that all personnel have good quality and intact safety shoes
4. Stop all dangerous height work during rain
5. Explain Do's and Don'ts to workers during Tool Box Meetings
6. Ensure that there are no weak structures, boards etc. that can fall during high winds
7. Do not allow any loose material (e.g. GI sheet, Ply board, empty cement bag, aluminium foil, foam sheets etc.) on roof sheds or top of structures.
8. Do not permit any one to ride up or come down scaffolds frame work during heavy wind or rain.
9. Provide "anchor" of adequate strength to scaffolds and other high-rise structures.
10. All rest sheds and GI sheds will be anchored into the round and wall and roof panels will be secured with J hook to prevent shed from blowing over or parts/pieces becoming airborne. Proper earthing per IS standard is also to be installed.
11. Do not go alone nor permit anyone to stay at tower-tops, roof-tops, high structures or on electrical poles during the course of stormy weather or heavy rain.

**B. Electrical:**

1. All electrical connections / loads have to be routed through ELCB / RCCB (residual current circuit breaker) whose rating should be 30mA.
2. RCCB operational checks need to be done DAILY / WEEKLY during monsoon season.
3. Avoid joints on power cables which need to be laid over-head or under-ground, better not to have any joint at all. In case joints become essential, such cables must be housed rigidly and insulation must be provided as per approved standard. The joint shall be suitable for outdoor use.
4. All electrical distribution board shall be properly covered at top and sides to protect from rain water. Extension boards shall be protected from rain water.
5. Ensure proper "earthing" for each and every electrical appliance.
6. Double earthing need to be provided for 3-phase power supply and for voltage more than 220V.

7. Provide lightening arrestors at the top of Boiler 3 and boiler 4 and rest sheds which are not covered by existing lightening arrestor of other installation.

**C. Others:**

1. Maintain smooth flow on open drains. i.e. no obstruction or blockade shall be made on storm water drains. If required, make temporary drains.
2. Arrange back-filling of excavated pits on war-footing basis.
3. Arrange bringing down booms of all cranes, hydra machines during stormy weather (wind speed 40-50 km/hr)
4. Confirm that all gantry cranes are effectively choked to prevent rolling and toppling.
5. Do not forget to deep ready a dew battery operated lights at site-offices during rainy season.
6. Avoid using wet damp clothes.
7. Hard Barricade excavated zone filled with water with scaffolding pipe & clamp with reflective net
8. Engage diesel operated water pump to dewater work area. For electrically operated water pump, the starter shall be protected from rain water. All rotating parts shall be guarded. Ensure availability of sufficient water pumps.

**D. Health and hygiene:**

1. Monsoon reduces the immunity of our body and makes us vulnerable to many diseases which are commonly associated with this season. It is time for us to keep our body challenging against disease by boosting our immunity and taking safety measures against these diseases.
2. The diseases associated with monsoon are Malaria, Jaundice, Gastro-intestinal infections, like typhoid, cholera etc. apart from these viral infections like cold and cough also make their presence felt. Majority of above said diseases are on account of:
3. Puddle of water formed due to rain become breeding grounds for mosquitoes which spread disease like, malaria and dengue fever. As a precautionary measure against mosquito-bite disease one can use mosquito net around the end which is better choice to mosquito repellents like mats and coils.
4. Pollution of drinking water during monsoon is very common. It is very necessary to drink clean and pure water when water-borne monsoon diseases like diarrhoea and gastro-intestinal infections threaten us.
5. Walking in dirty water during rainy season leads of numerous fungal infection which affect toes and nails. Diabetic patients have to take a special care about their feet. Keeping feet always dry and clean is very necessary. Avoid walking in dirty water. Keep shoes socks and raincoats dry and clean.

**E. Workmen will be made aware of following Do's and Don'ts:**

1. Do not sleep in daytime.
2. Avoid over physical exertion.
3. During lightning and thunder storm, do not take shelter under tree. Take shelter inside rest shed or store room.
4. Wash vegetables with clean water and steam them well to kill germs.
5. Avoid eating un-cooked foods and salads should be washed properly before consumption.
6. Drink plenty of water and keep body well-hydrated.
7. Always keep the surrounding area dry and clean. Don't allow to get water accumulated around.
8. Keep body warm as viruses attack immediately when body temperature goes down.

9. Do not enter air conditioned room with wet hair and damp cloths.
10. Dry your feet and webs with soft dry cloth whenever they are wet.
11. Eat light and less spicy food.
12. Avoid eating food which was cooked long time ago.
13. Eat salt in food to replenish loss of salt through sweating.

## 15.3 EMERGENCY WEATHER CONDITIONS

**Cyclone/Severe thunder storm**

In the event of Cyclone/Severe thunder storm, alert will be issued by subcontractor on notification received by Govt. authorities/Metrological departments Customer or BHEL.

**The actions required during cyclone/rough weather:**

1. Check and advice subcontractors to clean-up work area. Pick up all loose and unused material of respective supervisor's area.
2. Tie to secure all gas cylinders to avoid displacement and unsafe conditions which could be due to wind pressure.
3. Secure portable electricity generating sets and other equipment, pumps, hoses etc.
4. Make preparation for removal of water logging.
5. Take review of work activity and make preparation for removal of equipment and material from vulnerable areas.
6. Isolate/turn off all electrical power form the main panel/switches. Secure and anchor panels properly.
7. Recheck anchorage/tie of all temporary structures/sheds, tall objects, cranes, rigs, scaffolds etc. to avoid toppling due to wind force.
8. Cranes boom shall be secured, either locked or lowered the booms as reasonably and practicably possible and rigs to safe position for the safety point of view.
9. Group up all trash barrels, wooden pallets, forms; wooden decks etc. and anchor properly.
10. Welding machines, air compressors and such equipment are to be grouped together and secured to the stable objects. Welding leads, electrical cables, hoses are to be rolled up and secured properly.
11. Set on site vehicles on high ground in the site area with brakes set firmly.
12. Anchor all tanks, vessels, gas cylinders that may be moved by high wind and water.
13. Evacuate job site.

**Personnel Evacuation:**

1. Personnel Evacuation will be required if predicted wind speed and storm surge heights are beyond acceptable limits as per the instructions from Govt. Authorities/ Metrological departments or Customer.
2. Once the warning is received for personnel evacuation, an emergency response team shall be formed. The team will work with local authorities and other agencies formed/deployed to evacuate and transport all personnel involved in the project to the cyclone shelter.
3. Cyclone may be followed by the calm "EYE", be aware of it. If the wind suddenly drops, don't assume the cyclone is over. Violent wind may resume from the opposite side direction. Wait for the official "All clear Signal".

4. After the cyclone, do not go outside until officially communicated about safe situation outside. Use recommended routes for returning. Do not panic or rush while returning.
5. Checking of gas leaks and well-being of electrical appliances is essential before leaving the site.
6. Follow local communications for official warning and advice. The construction Manager shall also obtain updates from customer/metrological departments and communicate to the personnel on project site.

## 15.4 PREVENTION OF COVID-19 (COVID-19 HERE TO BE READ AS COVID-19 AND OTHER PANDEMICS/ COMMUNICABLE DISEASES) AT PROJECT SITE & LABOUR COLONY:

Resumption of Construction Activities after Lock Down and Prevention of Coronavirus Infection during Site Operations and OCP 61A: Prevention of COVID-19 Infection in Labor Colony will be strictly followed.

**A. Preventive measures at project site:**

- BHEL and Agencies shall nominate COVID Marshalls, who will be responsible for monitoring the COVID prevention measures and apprising management on the same.
- Mandatory health check-up for every worker/ official joining the site
- All activities to be carried out using least amount of paperwork and physical proximity as far as possible.
- ***HSE Observer App*** to be used to monitor HSE Activities and follow up with agencies for closure of non-conformities.

**a. Strict Control at the Gate/ Banning Entry to Anyone Not Wearing Masks**

i. Security personnel at the gate may erect a barricade preferably approx. 10 meters from the gate and only allow personnel who are wearing proper masks inside.

ii. Public address system may be used to warn any non-compliant visitors

iii. Near entry gate, round markers at minimum 1-meter distance to be ensured so that distancing is ensured

iv. A hand-wash or hand sanitiser facility is preferable at the gate to allow entry after hand wash or hand sanitisation. These are also to be provided at key locations to enable hand wash / hand sanitisation before starting work, before eating, etc.

v. Gutkha, Paan, tobacco etc. to be banned from the site. Spitting to be strictly prohibited.

**b. Screening at Gate with Contactless Thermometer & Action on Suspected Cases**

i. Security Personnel at the Gate to screen each person entering the premises using a non-contact infrared thermometer, which is duly serial numbered and calibrated.

ii. In case any site worker/ official is found to have fever more than 99 Degrees Fahrenheit or found coughing/ sneezing, he/she may be advised rest till recovery and entry to be permitted after obtaining clearance from medical officer/assistance/attendants.

- Parcel to be collected from gate by concerned person preferably with provision of Special Box
- Any construction material received at site, unless properly sanitized, to be kept undisturbed for at least 3 days and to be used only after that period.
- During Toolbox Talks, minimum 1-meter distance between any two workers to be ensured

**c. During site execution activities:**

For all site execution activities, social distancing is to be maintained. In case this is not possible due to nature of work, speciality of work, etc, ensure sensitisation of the labour/staff involved and use of appropriate PPEs, especially mandatory face mask. In any case, close working to be allowed only in special

circumstances and ensuring these activities are preferably time staggered to the extent possible

**d. In office premises:**

i. Sharing of items like pens, water bottles etc. in office premises to be avoided

ii. Doors preferably to be in open condition to avoid contact

iii. All common touch points to be frequently disinfected in a day.

**e. Regular disinfection of all Areas, Equipment and facilities**

i. A dedicated disinfectant gang to be identified for the task by each agency. The disinfectant gang to be provided full body suits for the task.

ii. All areas (including office premises, site areas, chairs, tables, furniture etc.), tools & equipment to preferably be disinfected by dedicated gang every day before resumption of work.

iv. Common touch points like handrails, lift buttons, door/window knobs or handles, vehicle door handles, taps, conference room & dining hall tables/chairs, common sofas/chairs, visitor sofa/chairs, files & folders, etc to preferably be disinfected regularly at frequent intervals every day.

v. Pool vehicles, to be disinfected after every use. Social distancing to be maintained inside the common pool vehicles as per Govt./ statutory body guidelines.

**f. Disinfecting the operator/driver touch points of Vehicles/cranes, T&Ps etc.**

Disinfection to also be carried out for all Cranes, Vehicles, Equipment, consoles, T&Ps etc. which come into contact with operating personnel.

**g. Posters on COVID-19**

Sufficient Posters on COVID-19 to be ensured across the site in languages understood by most workers.

**h. Brief guidelines for hand washing are as below:**

i. Soap to be provided at each wash basin and replenished regularly.

ii. Washing with soap for at least 20 seconds is recommended.

iii. As a general guideline, for every 100 workers, 1 wash-basin may be provided at site areas.

iv. Close queue to be avoided near wash-basins and 1-meter distance to be maintained. Round markers at 1-meter distance can be ensured as guidance

**Composition of Disinfectant:**

i. Readily available 1% hypochlorite solution or 4%

ii. Liquid chlorine-1% solution

Iii. Surgical spirit-95% alcohol content

iv. Hand sanitizer should have: Isopropyl alcohol-75%, Gycerol-1.45%, Hydrogen Peroxide-0.125%

**B. Prevention of COVID-19 Infection in Labor Colony:**

- Spacing of minimum 2 meters between living areas of workers inside a room may be maintained. Preferably, the living area of each worker may be partitioned using sheet of cloth, plastic etc.
- Rooms to be properly ventilated as far as possible
- Sanitation to be given prime importance and personal hygiene to be promoted
- Face masks shall be worn by everyone inside the colony premises
- Spitting of Pan. Gutkha etc. inside the colony and urinating etc. outside the toilets to be strictly avoided
- Regular visits by Doctors to the labor colony can be arranged on non-working day for check-up of all workers
- **Identification of "COVID Wardens" (CWs) by each agency for maintaining the following:**

i. Keeping an eye on the health of workers and report any suspected cases of fever, coughing etc. to the

management

ii. Keeping an eye on the social distancing measures in the labor colony and report any non-conformances to the management.

iii. Educate the workers about social distancing and COVID prevention measures.

- Training/ Awareness regarding COVID-19 to be provided to workers regularly.
- Workers to be instructed to maintain social distancing of minimum 1 m at all time
- **Posters on COVID-19:** Sufficient Posters on COVID-19 to be ensured across the labor colony in languages understood by most workers.
- All workers to be instructed to inform any suspected cases of illness (individual or others) to an emergency contact number of CW, the emergency contact numbers and CW contact numbers to be displayed at prominent locations
- **Inspection & Review**

  i. Daily Inspection by concerned COVID Wardens and reporting to Agency

  ii. Regular inspection by Agency & BHEL

### 15.5 Noise Mitigation

High noise is harmful to the human health and it can cause impairment if exposed for long duration at regular intervals, and also cause disruption in nearby communities.

- Noise monitoring shall be carried out in all construction locations periodically.
- Use of silent DG is allowed at site during construction.
- Low noise generation equipment's to be preferred.
- Work areas where noise levels exceed the 85db shall be posted as hearing protection required.
- Use of PPEs / ear plug/ear muff for personnel entering into high noise area.
- Activities generation High noise will be planned in day shift.

**Noise Level Chart**

| Parameter | Night Noise level dBA | Daytime Noise Level dBA |
|---|---|---|
| At 1-meter from each piece of equipment | 85 | 85 |
| At Property boundary | 70 | 70 |

# ANNEXURE J

First-Aid Box

**Details & Contents of First Aid Box as per Contract Labor (Regulation & Abolition Act), Central Rules, 1971**

(1) The first-aid box shall be distinctively marked with a Red Cross on a white background and shall contain the following items, namely:

**(a) For establishments in which the number of contract labor employed does not exceed fifty, each first aid box shall contain the following equipment:**

| | |
|---|---|
| (i) | 6 small sterilized dressings |
| (ii) | 3 medium size sterilized dressings |
| (iii) | 3 large size sterilized dressings |
| (iv) | 6 pieces of sterilized eye pads in separate sealed packets. |
| (v) | 6 roller bandages 10 cm wide. |
| (vi) | 6 roller bandages 5 cm wide. |
| (vii) | One tourniquet |
| (viii) | A supply of suitable splints |
| (ix) | Three packets of safety pins. |
| (x) | Kidney tray. |
| (xi) | 3 large sterilized burn dressings. |
| (xii) | 1 (30ml) bottle containing a two percent alcoholic solution of iodine |
| (xiii) | 1 (30 ml) bottle containing Sal volatile having the dose and mode of administration indicated on the label |
| (xiv) | 1 snake bite lancet |
| (xv) | 1 (30gms) bottle of potassium permanganate crystals. |
| (xvi) | 1 pair scissors |
| (xvii) | 1 copy of the First-Aid leaflet issued by the Director General, Factory Advice Service and Labor Institutes, Government of India. |
| (xviii) | A bottle containing 100 tablets (each of 5 grains) of aspirin |
| (xix) | Ointment for burns |
| (xx) | A bottle of suitable surgical anti-septic solution |

**(b) For establishment in which the number of contract labor exceeds fifty each first-aid box shall contain the following equipment:**

| | |
|---|---|
| (i) | 12 small sterilized dressings |
| (ii) | 6 medium size sterilized dressings |
| (iii) | 6 large size sterilized dressings. |
| (iv) | 6 large size sterilized burn dressings |
| (v) | 6 (15 grams) packets sterilized cotton wool |
| (vi) | 12 pieces of sterilized eye pads in separate sealed packets. |
| (vii) | 12 roller bandages 10 cm wide. |
| (viii) | 12 roller bandages 5 cm wide. |
| (ix) | One tourniquet. |
| (x) | A supply of suitable splints. |
| (xi) | Three packets of safety pins. |
| (xii) | Kidney tray. |
| (xiii) | Sufficient number of eye washes bottles filled with distilled water or suitable liquid clearly indicated by a distinctive sign which shall be visible at all times. |
| (xiv) | 4 per cent Xylocaine eye drops, and boric acid eye drops and soda by carbonate eye drops. |
| (xv) | 1 (60ml) bottle containing a two percent alcoholic solution of iodine |
| (xvi) | One (two hundred ml) bottle of mercurochrome (2 per cent) solution in water. |
| (xvii) | 1 (120ml) bottle containing Sal volatile having the dose and mode of administration indicated on the label. |
| (xviii) | 1 roll of adhesive plaster (6 cmX1 meter) |
| (xix) | 2 rolls of adhesive plaster (2 cmX1 meter) |
| (xx) | A snake bite lancet. |
| (xxi) | 1 (30 grams) bottle of potassium permanganate crystals. |
| (xxii) | 1 pair scissors |
| (xxiii) | 1 copy of the First-Aid leaflet issued by the Director-General, Factory Advice service and labor Institutes, Government of India. |
| (xxiv) | a bottle containing 100 tablets (each of 5 grains) of aspirin |
| (xxv) | Ointment for burns |
| (xxvi) | A bottle of a suitable surgical anti septic solution. |

(2) Adequate arrangement shall be made for immediate recoupment of the equipment when necessary.

# ANNEXURE K

Vertigo Test

# Vertigo Test Procedure/ Guidelines

This document specifies minimum requirements for vertigo test. These may be supplemented by any additional requirements deemed fit by the medical examiner/ HSE department)

Fear of height may be physiological or psychological. Therefore, to rule out any possibility of physiological factor, detailed medical check-up of workers is carried out before vertigo test. Medical check-up of workers includes the following:

history of past illnesses (like epilepsy, drug allergy, diabetics/ hypertension, unconsciousness etc.), general physical examination (like height, weight, BMI, build and nourishment etc.), measurement of pulse rate, Blood Pressure, respiratory rate.

After this check-up, those who are found suitable for height work by examining doctor, are allowed to undergo vertigo test.

During this health check-up, psychology of workers is also studied. If any worker finds it extremely difficult/ frightening to climb the monkey ladder & walk on the beam, during/after performing vertigo test or even before performing, then he is treated as disqualified.

As per standard, during vertigo test, worker is allowed to climb on a foundation through monkey ladder, walk on a beam, then steps down at the other end of beam, through monkey ladder. Height of the beam should be at least six feet from ground level. All necessary safety precautions are taken during this test. Worker has to wear full body harness with double lanyard. A horizontal lifeline is run parallel to the beam and worker has to put his lanyards into the lifeline. Additionally, a safety net is also put below the beam for rescue of the victim in case of a fall from beam.

**Following activities are suggested to be carried out during testing:**

1. **Walking Bench Training:**
   a. Person should walk over the channel. He should maintain balance & walk without much problem.
   b. If the person has problem to balances himself on repeated chances, he may be having flat foot or some other problem. So, he may not be fit for height work.
2. **Rope Climb Training:**
   Person should be able to climb the rope up to the top channel for ensuring that in case of fall, a person hanging on the safety harness, will be able to safely climb back to the platform within minimum time period before the safety harness start breaking down under the load.
3. **Height Work Training:**
   Person should walk freely on the middle channel while holding the top channel with the help of safety harness.
4. **Ladder for Vertical fall arrestor Training:**
   Vertical fall arrestor rope is fixed from top to bottom of the ladder. It will ensure:
   - Usage of vertical fall arrestor.
   - Usage of two lanyards of a safety harness.
   - Ensure 3-point contact on the ladder while climb.
5. **Chair for work at height Training:**
   - Climb though vertical ladder with two lanyard ropes.
   - Hooking of two lanyard ropes to life line. With this safe arrangement, he can walk to chair.
   - Sits in the chair safely, comes out & walks back to the vertical ladder & come down from vertical ladder. After completion of vertigo test, blood pressure of worker is again measured. If it is not within acceptable limits for any worker, concerned worker is denied height pass.

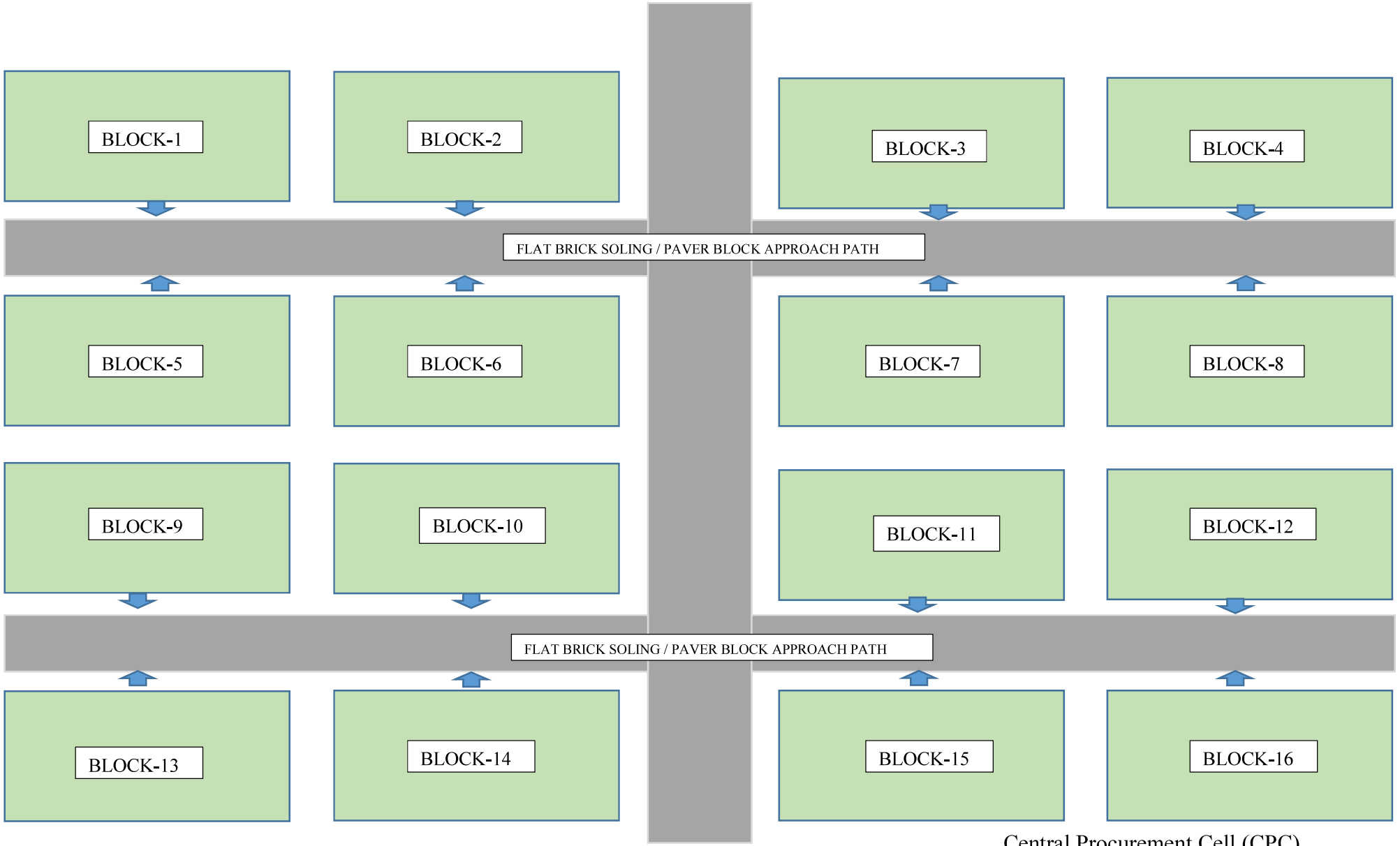
Only those who pass the above training are to be considered as fit for height work.

## Annexure-4: IP Camera Specification

| IP Camera Specification (Fixed / PTZ) | |
|---|---|
| **PARAMETER** | **ACCEPTABLE VALUE** |
| Image Sensor Type | Progressive Scan CMOS |
| Image Sensor Size | 1/2.8" ~ 1/3" |
| Camera Image Sensing Capacity (Picture Mode) | 2 MP or Better |
| Resolution | Full HD (1920 x 1080 Pixel) at 25/30 IPS |
| Day & Night Capable | Yes |
| IR Illumination Range (Mtr.) | 200 or Better (For PTZ)<br>90 or Better (For Fixed) |
| Focal Length | 4.45 ~4.7 to 142.4 ~ 150.4 or better (For PTZ)<br>Varifocal Lens f = 8 ~ 50 mm (For Fixed) |
| Iris Range | F1.6 ~ F2.9 (For PTZ)<br>1.6 ~ 360 (For Fixed) |
| Electronic Shutter | 1/50 ~ 1/10000 Auto |
| Sensitivity (at 6dB) | Color mode: 0.6 lux ; B/W mode: 0.04 lux@ 30IRE, F1.6 (For PTZ)<br>Color mode: 0.21 lux ; B/W mode: 0.05 lux @ 30IRE, F1.2 (For Fixed) |
| Horizontal Angle of View | 55.4 deg (Wide) ~ 3.5 deg (Tele) or Better |
| Frame Rate (fps) | 25 or Better |
| Lens Type | Motorized Varifocal |
| Type of Camera housing | Dome type (For PTZ)<br>Bullet Type (For Fixed) |
| IP Camera | Yes |
| Pan/Tilt Range | 360 Deg Continuous / 90 Deg (For PTZ) |
| Optical/Digital Zoom | 20X/12X or Better |
| Back Light Compensation | Required |
| White Balance | Automatic with mode selection options |
| Audio Support | Full Duplex or 2-way |
| Alarm Support | Minimum 2 Alarm I/Ps & 1 Alarm O/p (For PTZ)<br>Minimum 1 Alarm I/P & 1 Alarm O/p (For Fixed) |
| Signal to Noise Ratio | >50 dB |
| Automatic Gain Compensation | Up to 18 dB |
| IR cut-filter | Yes |
| Installation Type | Outdoor |
| Protection | IP 65 or Better |
| Vandal resistant housing | Yes with Sun shroud |
| Mounting Bracket | Pole Mounted |
| Power Input | 12/24 V DC / 24 V AC (Adapter to be provided), PoE |
| Operating Conditions | 0 DegC to +60 DegC / 0% to 90% RH |
| ONVIF Support | Yes |

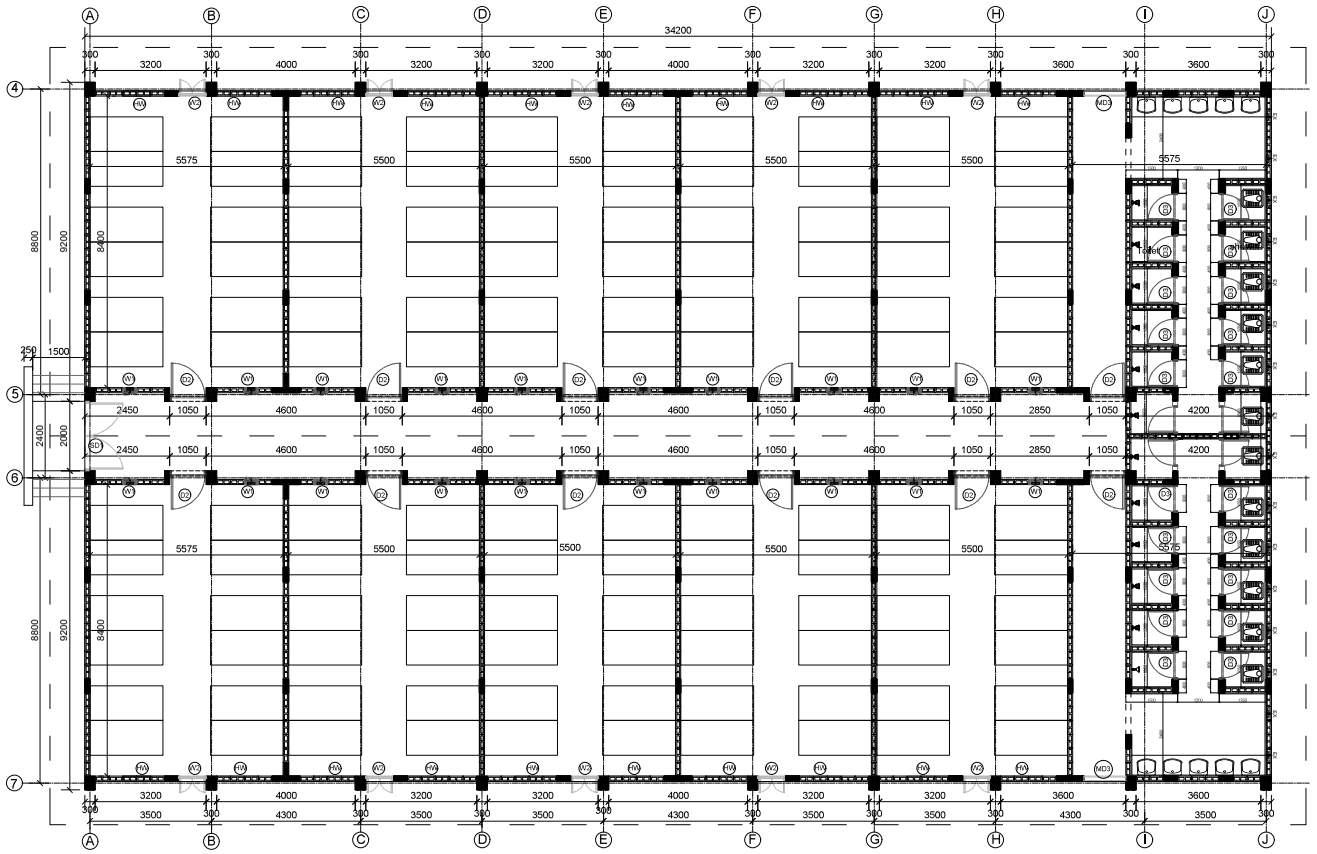
## Annexure-5: Gen. Layout arrangement Typ. Layout for workmen Shed

**Annexure-IA**: General Layout Arrangement of Worker's Establishment for BHEL-Project site




Central Procurement Cell (CPC)

BHEL-PSHQ




TYPICAL LAYOUT FOR WORKMEN'S SHED (120 nos.)

## NOTES:-

1. ALL DIMENSIONS ARE IN MILLIMETRE AND ELEVATIONS ARE IN METRE U.N.O.
2. DRAWING SHALL BE READ IN CONJUNCTION WITH THE TERM & CONDITIONS, AS SPECIFIED IN ANNEXURE A–STANDARD GUILDELINES.
3. GENERAL LAYOUT PLAN FOR ACCOMMODATING 120 WORKERS WITH TOILET FACILITIES HAVE BEEN PROVIDED IN THE DRAWING. IN CASE, AGENCIES ARE REQUIRED TO DEPLOY MORE/LESS NUMBER OF WORKMEN AT SITE, THE SIZE/ NO. OF SHED MAY BE INCREASED/DECREASED ACCORDINGLY IN CONSULTATION WITH BHEL SITE.
4. THE TYPE AND NATURE OF CONSTRUCTION FOR WORKER ACCOMMODATION SHEDS SHOULD BE PREFERABLY UNIFORM FOR ALL THE AGENCIES SO AS TO BRING OUT A PLEASANT AESTHETIC VIEW OF THE WORKER'S ESTABLISHMENT.
5. FOR WOMEN WORKERS DEPLOYED AT SITE, EXCLUSIVE SEPARATE FACILITIES (SHEDS, BATHROOMS, ETC) CONSIDERING THE PRIVACY & SAFETY OF WOMEN SHOULD BE PROVIDED BY THE AGENCY.
6. THE CLEAR CEILING HEIGHT OF THE BARRACKS SHOULD BE MINIMUM 3 METRES.
7. DOORS & WINDOWS SHALL BE OF METAL MAKE.
8. LAND FOR LABOUR COLONY SHALL BE ARRANGED BY CONTRACTOR AT THEIR OWN COST AS PER AVAILABILITY OUTSIDE PROJECT AREA PREFERABLY WITHIN 5KM. NECESSARY LEVELLING/DRESSING OF LAND SHALL BE DONE BY THE CONTRACTOR.
9. WATER & ELECTRICITY FOR WORKER ESTABLISHMENTS SHALL BE SUITABLY ARRANGED BY THE AGENCY WITH PROPER ELECTRICAL WIRING AND FITTING. FITTINGS LIKE FANS, LIGHTING, ALL SWITCHES AND SOCKETS, ETC.
10. SUFFICIENT NUMBERS OF TOILETS, URINALS AND BATHING ROOM WITHIN EACH BARRACK/SHED WITH COMPLETE WATER SUPPLY SYSTEM. MINIMUM 1 NOS. URINAL CUM TOILET FOR EVERY 10 PERSONS AND 1 NO. BATHING ROOM FOR EVERY 10 PERSONS SHOULD BE ENSURED.
11. SEPTIC TANK/BIO-DIGESTER WITH PROPER INLET/OUTLET CONNECTION TO BE PROVIDED FOR EACH SHED.
12. PROPER APPROACH ROAD TO THE LABOUR COLONY & ITS CONNECTIVITY WITH EACH BARRACK WITH NECESSARY HARD SURFACING PREFERABLY WITH BRICK FLAT SOLING/PAVER BLOCKS/PCC PAVING.
13. THE WALL PANEL SHALL BE AEROCON PANEL OF MIN. 50MM THK.
14. ROOF SHALL BE OF METALLIC COLOR COATED PROFILED SHEET WITH PROPER. UNDER DECK INSULATION & FALSE CEILING (B.O.False Ceiling 3m).
15. WINDOWS SHALL BE OF METAL MAKE, OPENABLE WINDOW WITH MIN. 6mm THK. TOUGHENED GLASS.
16. DOORS SHALL BE OF METAL DOOR FRAME WITH SOLID CORE FLUSH DOOR SHUTTER.

BHARAT HEAVY ELECTRICALS LTD
POWER SECTOR
CENTRAL PROCUREMENT CELL (CPC)
PSHQ

TITLE

TYPICAL LAYOUT FOR WORKMEN'S SHED (120 nos.)

SCALE NTS DRAWING NO. PSHQ/A-1
SHEET 1 OF 1 REV 0
SIZE-A3