



TECHNICAL ENQUIRY SPECIFICATION

for

Wagon Tippler Package

**(Wagon Tippler, Side Arm Charger with Indexer,
Apron Feeder Dribble Feeder, EOT crane etc.)**

of

SAGARDIGHI THERMAL POWER PROJECT

1 x 660 MW UNIT NO. 5, PHASE – III

WEST BENGAL POWER DEVELOPMENT CORPORATION LIMITED



BHEL- ISG, BANGALORE 	Coal Handling Plant for 1X660 MW WBDCL, Sagardigi TPP Technical Enquiry Specification for Wagon Tippler Package	Specification Number IS-4-EQ-724-100-M001
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LIST OF ENCLOSURES:

Following enclosures is an integral part of this technical enquiry and must be signed and stamped and submitted along with the offer:

001- ANNEXURE-1- WBDCL TENDER SPECIFICATION

002- ANNEXURE-2– WBDCL AMENDMENT & CLARIFICATIONS

003- ANNEXURE-3– BHEL ELECTRICAL SPECIFICATION.

004- ANNEXURE-4 – DRAWINGS FOR TENDER PURPOSE

Plot Plan with Drawing Number PE_DG_445_100_M001_P0, and

Coal Flow Diagram Drawing Number IS-1-FL-724-100-M001 R-0.

005- ANNEXURE-5 - BHEL HSE Manual (16 Pages) & PPE MANUAL (142 Pages)

006- ANNEXURE-6- WBDCL Vendor list

007- ANNEXURE-7- Datasheet to be filled by bidder & to be submitted with bid

008- ANNEXURE-8- LIST OF MANDATORY SPARES (IN BIDDER'S SCOPE)

009- ANNEXURE-9- DRAWING SUBMISSION SCHEDULE

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01.00.00 PROJECT INFORMATION:

Coal Handling Plant for 1 X 660 MW Sagardigi Thermal Power Project of WEST BENGAL POWER DEVELOPMENT CORPORATION LIMITED for the Salient Features of the Project site refer Annexure-X enclosed.

02.00.00 BROAD SCOPE OF WAGON TIPPLER PACKAGE BIDDER:

The scope for Wagon Tippler package, vendor shall include Design, Detail Engineering, Submission of Engineering, Civil & Structural Drawing/Doc./Datasheets/QAPs/FQPs, getting Approval from the Customer, Manufacturing/Fabrication, Inspection/Shop Floor Testing, Shop Floor Painting, Packing, Supply, Transportation to Site in Proper Packing, Receipt & Unloading at the Site, Construction of Open storage yard and closed storage shed, Shifting To Storage, Preservation & Security at the Site, Shifting to Erection Work Place, Erection, Filling of the Consumables till Handing Over, Trial Run, Commissioning, Functional Testing, O&M before handing over of all equipment, Performance Guarantee Testing of twin Wagon Tippler (Tandem type) , Side Arm Charger, indexer, Apron Feeder, Dribble feeder Machines, EOT-crane, Bobcat/equivalent machine. PG Test of the Machines is in the Bidder's Scope in Accordance with The Conveyor System (conveyor system is in BHEL scope).

The following Main Equipment with Associated Accessories are under Vendor's Scope of Supply and Works.

SL. NO.	ITEM DESCRIPTION	QUANTITY
1	One (1) Rotary twin Wagon Tippler (Hydraulically operated only, Crescent Type Tippler) complete with all accessories including driving accessories, rack & pinion, twin wagon tippler table complete with rails, rail fixture, integrated weigh bridge, cradle, sustaining beam, clamping arrangement etc. as required for safe, reliable and trouble free operation. with electricals etc as per spec.	1 Set
2	One (1) Side Arm Charger and one (1) Indexer with the Twin Wagon Tippler complete with the carriage, attachment for disengaging the front wagon, drive, drive pinion, chain, necessary rail, rail fixtures, cable for the travel of the machines, limit switches, brakes, necessary stops with buffer etc. as required for safe, reliable and trouble free operation of the plant. with electricals as per spec.	1 Set
3	Two (2) sets of Apron Feeder below the Two (2) nos. of Wagon Tippler Hoppers complete with dribble feeders, skirt, flow control arrangement, drives and supports with discharge chute and hood with electricals etc as per spec.	2 Set
4	Air conditioning for Wagon tippler control room with electricals etc as per spec.	1 Lot
5	One (1) no E.O.T. Crane having hoist capacity of 20T/5T (Main/Auxiliary) with supply of rail including electricals as per Technical specification	1 Lot
6	Bobcat S-450 or equivalent for stone/boulder removal from grating as per spec.	1 No

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SL. NO.	ITEM DESCRIPTION	QUANTITY
7	Mandatory spares for all equipments under this package as per spec	1 Lot
8	Design & Drawings of Civil & Structural Works of Wagon Tippler Complex: Design & drawings of Civil & Structural works of entire complex, which includes base raft, walls, counterforts, hoppers, floors, side-arm charger, indexer, structural shed including its foundations, control room, power pack room, equipment foundations of DE, DS & Ventilation systems, trenches below the rail lines, civil details of rail stopper arrangement, gratings, grade slab with drainage & dozer movement arrangements, review, checking & approval of fabrication drawing of WT shed etc. complete.	1 Lot
9	Providing 3D model of complete Wagon Tippler complex as per scope of work described in this specification and customer's NIT specification.	1 Lot

Notes:

- a. The WBPDCCL Technical specification, General Technical Specifications/Requirements, Amendments, and BHEL HSE given with this specification, which shall be read with in conjunction this technical specification and shall form part of the tender. Bidder shall submit a signed copy of BHEL's this Tender Enquiry Specification along with all enclosures as Technical Offer with the Bid without any Deviation.
- b. Complete Detailed Engineering Drawings, Calculations, Selection of Components etc. shall be reviewed by BHEL Engineers and Plant Owner during Detail Engineering.
- c. Bidder has to follow drawing submission schedule as per list attached in Annexure-9.
- d. Successful Bidder shall take Prior Approval from BHEL while placing the E&C Contract Order for this Package to their Sub-Contractor. BHEL reserves the Right to Disapprove/Reject any such E&C Contractor which BHEL deems not fit for executing E&C of this Contract.
- e. Bidder to quote for this offer considering the Enclosed Plot Plan with Drg. No. IS-1-GA-724-101-M002 Rev-0 and Coal Flow Diagram Drawing No IS-1-FL-724-100-M001 R-0.
- f. Bidder shall furnish the Guaranteed Power Consumption in KW for the Machine along with the offer and Complete Drive Schedule. Bidder to note that BHEL has consider the auxiliary power consumption of **650 KW** for twin wagon tippler, SAC, Indexer, Apron Feeder & Dribble Conveyor. BHEL shall load the price per kW of guaranteed power consumption for any increase on BHEL declared value during price evaluation at the rate of Rs 462,000/-per KW of excess power consumption.
- g. **For PRE QUALIFICATION REQUIREMENT bidder is requested to refer contract terms and conditions. Only qualified bidders will be considered for further bid evaluation.**
- h. **The bidder shall obtain all statutory approvals from the relevant RDSO/Railway authorities, before the wagon tippler complex is put into operation. Any statutory payment charges, to be made to the concerned authorities shall be to Bidder's account. It is the responsibility of the Bidder to carry out any modifications as required by the RDSO/Railway authorities, at no extra cost to the Owner.**

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03.00.00 SYSTEM DESCRIPTION AND SCOPE OF WORK & SERVICES

03.01.00 INTENT OF SPECIFICATION

The package shall be on the basis of single point responsibility, completely covering the following activities and services in respect of all the equipment & works specified and covered under the specifications:

- a. Basic Engineering of the complete wagon tippler complex with all associated equipments as per WBPDCCL/ BHEL requirement.
- b. Detailed design of all the equipment and equipment system(s) included in bidder's scope. (All general arrangement drawings and equipment/ system drawings along with load data, various schedules/ power calculations etc. as per WBPDCCL/BHEL requirement)
- c. Providing engineering drawings, civil & structural drawing/ doc. / datasheets/ QAPs/ FQPs, equipment sizing & performance data, instruction manuals, as built drawings and other information.
- d. Responsibility of getting drawing approval from customer is in bidder's scope.
- e. Compliance with statutory requirements and obtaining clearances from statutory authorities like RDSO etc, wherever required for all the equipments and systems covered under the scope.
- f. Complete manufacturing including shop testing/ type testing. Bidder to offer all the items/ materials for inspection, by BHEL/ WBPDCCL/third party as the case may be, prior to dispatch from shop. Necessary approval for drawing/ documents for all item/ equipments from WBPDCCL/ BHEL shall be obtained by the bidder prior to procurement/ manufacturing. Make approval shall be taken by the bidder from WBPDCCL for all the items prior to procurement/ manufacturing
- g. Packing and transportation from the manufacturer's works to the site including logistic studies, customs clearance & port clearance, port charges, if any.
- h. Receipt, storage (with construction of Open storage yard & closed storage shed), preservation, handling and conservation of equipment at the site.
- i. Fabrication, pre-assembly, if any, transportation within site, erection, testing, commissioning and completion of facilities including putting into satisfactory operation of all the equipment including successful completion of initial operation.
- j. Performance and guarantee tests after successful completion of initial operation
- k. Supply of spares on FOR site basis
- l. Reconciliation with customs authorities, as required
- m. Conclusion of the contract.

The Bidder shall be responsible for providing all material, equipment and service, which are required to fulfill the intent of ensuring operability, maintainability, reliability and complete safety of the complete work covered under scope of work in this specification, irrespective of whether it has been specifically listed herein or not. It is not the intent to specify herein all aspects of design and construction; nevertheless, the equipments shall conform in all aspects to high standard of engineering, design and workmanship and shall be capable of performing in continuous commercial operation in a manner acceptable to WBPDCCL, who will interpret the meaning of the specification and drawings and shall have a right to reject or accept any work or material which in his assessment is not complete to meet the requirements of this specification and/or applicable to Indian/ International standards mentioned elsewhere in this specification.

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Bidders shall submit the offer strictly in line with the technical specifications and instructions provided in this document. In case the requirements mentioned in these documents are not complied with, the offers may be considered as incomplete and would become liable for rejection.

03.02.00 **SYSTEM DESCRIPTION**

- 03.02.01 Coal of (-) 300 mm size shall be received at Sagardigi site by BOX-N wagons. From BOX-N wagons coal shall be unloaded on Wagon Tippler Hoppers.
- 03.02.02 Coal received by BOX-N wagons, shall be unloaded in Wagon Tippler Hoppers by Twin Wagon Tippler. From W.T. Hoppers coal shall be evacuated by Apron Feeders and shall be fed to Conveyor 29A or 29B for onward conveying to TP-23.
- 03.02.03 The entire coal handling plant from wagon tippler to boiler bunkers shall be designed so that both the streams of conveyors and equipment can be run simultaneously and safely without any problem, in case of emergency operation of the plant. The design/rated capacity of each stream is considered to be 1500/1650 TPH respectively.
- 03.02.04 All equipment of Coal Handling Plant shall be suitable for 24 hours a day, round the clock operation.

03.03.00 **SCOPE OF WORK & SERVICES**

The scope of the Coal Handling System to be supplied, constructed/ erected and commissioned under this contract shall be as per this Specification. The equipment and services detailed in all the sections of the bid documents including tender drawings shall be in the scope of the bidder. The scope of work shall include, but not limited to the following:

- 03.03.01 One (1) Rotary twin Wagon Tippler (Hydraulically operated only, Crescent Type Tippler) complete with all accessories including driving accessories, rack & pinion, twin wagon tippler table complete with rails, rail fixture, integrated weigh bridge, cradle, sustaining beam, clamping arrangement etc. as required for safe, reliable and trouble free operation.
- 03.03.02 One (1) Side Arm Charger and one (1) Indexer with the Twin Wagon Tippler complete with the carriage, attachment for disengaging the front wagon, drive, drive pinion, chain, necessary rail, rail fixtures, cable for the travel of the machines, limit switches, brakes, necessary stops with buffer etc. as required for safe, reliable and trouble free operation of the plant.
- 03.03.03 One (1) Operator's Cabin cum control room, one (1) hydraulic room with twin wagon tippler for controlling the operation of Twin Wagon Tippler in conjunction with Side arm charger & Indexer
- 03.03.04 Two (2) sets of Apron Feeder below the Two (2) nos. of Wagon Tippler Hoppers complete with dribble feeders, skirt, flow control arrangement, drives and supports for evacuating ROM Coal at the rate of 1650 / 1500 TPH (Designed / Rated) from Wagon Tippler Hopper.
- 03.03.05 There are two (2) no. of RCC Wagon Tippler Hoppers Each of 225 m3 capacity minimum (Water filled volume) along with accessories to cater feeding of coal from twin tippler. Minimum 50 thick Guniting liner shall be provided on all internal walls of the hopper and other areas inside the hopper coming in contact with coal.

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- 03.03.06 One (1) set of Apron Feeder below each Wagon Tippler Hopper complete with dribble feeder, skirt, flow control arrangement, drives and supports for evacuating ROM Coal at the rate of 1500 TPH from Wagon Tippler Hopper. Bidder shall also provide Apron feeder discharge chute with hood and supporting structure also.
- 03.03.07 R.C.C. Wagon Tippler Hopper size of 225 M³ capacity minimum for each W.T. and shape along with accessories shall be consider in designing wagon tippler complex by bidder. 50 mm thick guniting on all internal walls of the hopper and other areas inside the hopper coming in contact with coal shall also consider while designing.
- 03.03.08 Suitable air-conditioning for each Wagon tippler control room as required and all electrical to be provided by successful bidder.
- 03.03.10 **NOTE:** Bidder to design the Wagon Tippler Complex in such a way so that depth of excavation shall be desirably within 24 metres for accommodating Twin Tippler Hopper, Apron Feeder, Dribble Feeder and associated belt conveyors with flap gates. Bidder has to consider construction methodology and protective work accordingly
- 03.04.00 One (1) no electronic weighing system below each wagon tippler table including all necessary supporting structure, load cells, all electricals shall be provided by bidder.
- 03.05.00 One no EOT crane 20T main hoisting and 5T auxiliary hoisting capacity with rail in the Wagon Tippler complex shed covering both the Wagon Tippler shall be provided by bidder. Lift shall be considered from bottom of Wagon tippler complex. Rail shall be supported on structural member. Fixing of rail with necessary alignment shall be in bidder's scope. Structural work for shed is not in bidder's scope, however general arrangement and load data for shed shall be provided by bidder.
- 03.06.00 Supply of hydraulic drive for Wagon tippler and Side Arm Charger including hydraulic motor, cylinder, power packs enclosed in dust and moisture proof cubicles, oil cooling system, base frame, all field piping & instrumentations, electrical motors, hydraulic oil, all electricals, controllers shall be in bidder's scope. Power packs shall be placed in steel cubicles which shall be completely dust proof, robust in design with optimized sizing. Hydraulic cylinders shall be supplied filled with hydraulic oil and shall be changed after supply to site (if required) in order to avoid corrosion inside the cylinder if erection is delayed. Required service engineer shall be sent to site for checking condition of hydraulic equipments periodically and necessary preventive action shall be taken to prevent corrosion.
- 03.07.00 Bidder shall consider to supply & replenish the items like all rubber parts, oil, filter elements (for oil and air) due to natural ageing process & long storage before commissioning of the system. If any items which lead to corrosion of internal parts due to improper or long storage shall be made good for proper functioning by bidder before erection and commissioning of the system.
- Supply and installation of all safety guards, platforms, anchor bolts, foundation bolts/plates, sleeves, nuts and inserts to be embedded are to be supplied by the bidder under this specification.
- 03.08.00 All commissioning and mandatory spare parts required for the plant & equipment under this specification.
- 03.09.00 All fill of lubricants, hydraulic oil till the plant is taken over by Plant Owner.

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- 03.10.00 All tests at works and site as described elsewhere. Also supply of all equipments and accessories required for the same.
- 03.11.00 All erection and commissioning work, operation & maintenance till handing over, performance guarantee of all equipments under this package as described elsewhere.
- 03.12.00 All items which are not mentioned specifically but are required for safe, reliable and trouble-free operation of the plant and equipments.
- 03.13.00 Any additional items which may become necessary as per normal engineering practice during detail engineering.
- 03.14.00 Belting for Dribble Conveyors shall be in the scope of the Bidder. Belt shall be as per NIT.
- 03.15.00 Design of Wagon tippler complex, Preparation of GA Drg., Civil & Structural Drgs. for Wagon Tippler Complex shall be the Scope of the Bidder and necessary inputs and Equipment GA Drgs. shall be furnished by the Bidder in Editable Soft Copies.
- 03.16.00 **3D Modelling Work of Wagon Tippler Complex**
 3D model of complete Wagon Tippler Complex including all civil structure, all mechanical equipments, piping (>50mm), electrical equipment, HVAC associated with coal handling system shall be prepared in Aveva PDMS or Intergraph Smart Plant 3D software. The model shall be provided in following format:
- Smart 3D models published in ZVF and XML format.
 - PDMS models published to RVM and ATT format.
- Vendor shall provide delivery date of sequential completion of 3D modelling work with submission of project schedule.
- 03.17.00 All Commissioning and Mandatory Spare Parts required for all equipments under this Specification are in the Bidder's Scope. Commissioning Spares shall be handed over to the Customer as per NIT. Spares required during operation and maintenance of the equipment as specified in cl. No 11.00.00 shall be in bidder's scope.
- 03.18.00 All Special Tools and Tackles required for the Equipments under this Specification which are not specified in NIT.
- 03.19.00 All Drawings, Documents, Manuals etc. as described in Various Sections of this Specification.
- 03.20.00 All Electrical, Instrumentation and Control works as specified in Relevant Part of specification.
- 03.21.00 **Bidder should indicate "Operation & Maintenance charges" per shift in their offer for total 300 shift.** O&M will become effective/ operative only after the successful commissioning and handing over of complete Conveyor Package, if felt necessary by BHEL/ WBPDCCL. The O&M Charges are payable only with certification by BHEL's Resident manager. The payment will be done on actual usage on monthly basis as per BHEL prevailing rates. The quoted rate shall be valid for a period of 2 Years after commissioning / Handing Over. (Please refer O&M scope & manpower details described in this specification, Clause No-11.00.00)
- 03.22.00 All Items which are not mentioned specifically but are required for Safe, Reliable and Trouble-Free Operation of the Equipment.
- 03.23.00 Any Additional Items which may become Necessary as per Normal Engineering Practice during Detail Engineering.

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03.24.00 Technical Specification (Civil & Structural)

Bidder's scope of work includes design & drawings of Civil & Structural works of entire wagon tippler complex, which includes base raft, walls, counterforts, hoppers, floors, side arm charger, indexer, structural shed including its foundations, control room, power pack room, equipment foundations of DE, DS & Ventilation systems, trenches below the rail lines, civil details of rail stopper arrangement, gratings, grade slab with drainage & dozer movement arrangements,

03.24.01 Notes:

- (1) Structural design and detail engineering of all facilities of CHP package in the scope of the bidder is to be done in-house. If the design is to be outsourced; bidder has to take prior approval for design outsourcing from BHEL.
- (2) During detail engineering, General arrangement drawings to be submitted for first review /approval along with Mechanical GA drawings.
- (3) Wherever required in the absence of inserts plates etc. HILTI make or any other approved anchor fasteners supply & fixing to be included in the scope of bidder.

03.25.00 For further clarification and details bidder to consider Customer NIT specification including all amendments and post bid resolutions attached in annexure-2. Following documents are the part of this enquiry specification and provided with annexure-1.

- A. WBPDCCL Lead Specification vol: IIA
- B. WBPDCCL Technical Enquiry spec vol: II-H1 (CHP: Mechanical)
- A. MISCELLANEOUS CRANES-Vol-II -J-Sec-2
- B. TECHNICAL SPECIFICATION FOR AIR CONDITIONING SYSTEM-Vol-IIK4-Sec-1
- C. WBPDCCL Technical Enquiry spec vol: IIG/1, IIG/2, IIG/3 (civil),
- D. WBPDCCL Technical Enquiry spec (electrical)
- E. WBPDCCL Tender drawings (Mechanical, Civil, electrical, I&C)
- F. Signed post bid resolutions.
- G. Amendments -1 to 6
- H. WBPDCCL Condition of Contract Vol-I which includes following:
 - a. WBPDCCL General Conditions Section-3
 - b. WBPDCCL Special Conditions for Erection and Construction Section-4

04.00.00 NOTES FOR WAGON TIPPLER PACKAGE (MECHANICAL SCOPE OF WORK)

Bidders to also consider following things in their scope apart from referred bid document and broad scope mentioned above and

General Notes:

1. In case of any ambiguity, conflict in the standard & specification and/or interpretation of clauses in this enquiry spec. And its enclosures the decision of BHEL shall be final and binding and any change due to this shall have no price implication on BHEL and shall have to be absorbed by the successful bidder.
2. Bidder shall strictly follow and adhere to the guidelines laid down in the enclosed BHEL's health, safety and environment manual.

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3. Bidder shall refer customer NIT for CHP-mechanical/electrical enclosed as annexure-1 and annexure-2 in the form of soft copy.
4. Bidder shall visit the site to familiarize with the coal handling system and site constraints before submitting the complete offer to BHEL in all respects. No issues arising out of site condition or layout constraints shall be entertained later on during detail engineering and any modification required due to site condition or layout constraints shall be done by the successful bidder without any cost implication to BHEL.
5. Bidder shall ensure the correctness of civil drgs. Any issues like cutting/chipping of floors, beams shall not be permitted. Any additional civil works arising if missed out things in civil drg. prepared by the bidder like pedestal, foundation etc. Shall have to be taken care by bidders without any cost implication to BHEL and engaging its own resources.
6. At least one qualified Graduate/ Diploma civil engineer with min. 5 yrs. of site experience shall be deputed at site for Engineering Coordination and expert supervision during execution of civil & structural work of the CHP package for a period of 12 months from the date of intimation by BHEL. If the above requirements are not complied BHEL will engage directly and recover monthly charges.
7. Supply of grouting cement (GP-2 or equivalent) and grouting of all mechanical equipment/items and its drives base shall be in the bidder's scope. BHEL's civil contractors shall provide only the foundation pockets for pedestals as per mech. GA drg. of the bidder.
8. Bidder shall depute continuously and maintain & depute following minimum nos. of engineers and supervisors, not limited to nos., at site for supervision of E&C, coordination and commercial activity for the package as and when required.
 - a. **Resident Manager- 1 no.**
 - b. **Mech. Engineer (Min 2 yrs. Site Exp.) or Mech. Supervisor (Min 5 yrs. Exp.)- 1 no**
 - c. **Elect. Engineer (Min 2 yrs. Site Exp.) or Elect. Supervisor (Min 5 yrs. Exp.)-1 no.**
 - d. **Civil Engineer (Min 5 yrs. Site Exp.) -1 no.**
 - e. **Store-Keeper 1 no.**

In case the bidder fails to maintain the above minimum manpower/site staff at site till project completion, suitable pro-rata deductions shall be made from RAB payables, for the duration of such absences, at the prevailing rate of BHEL manpower cost as penalty at the sole discretion of BHEL whose decision shall be final and binding.
9. Supply of all insert plates, stools, anchor bolts, and other embedment in concrete and it's fixing with structural members required for machine erection during erection shall be in scope and done by the bidder in coordination with BHEL's civil & structural contractor during erection work.
10. The construction of store (open and close) shall be in the bidders' scope
11. Minor chipping i.e. Up to 50mm thk., micro leveling, and providing shim plates for erection of machines equipment/items shall be in the scope of bidder.
12. Bidder shall be responsible for commissioning of individual machines, demonstration of performance guarantee parameters of individual machines as laid down elsewhere in the specification and support to BHEL's other vendors for integration with main CHP system like conveyors system, auxiliary system and commissioning of the complete CHP after integration with the machines and other CHP system. Equipment/systems offered by the bidder shall not be accepted for final handover till the demonstration of performance guarantee

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parameters of the equipment/systems and in case any changes required in machines to match the overall CHP system PG test parameters without affecting other associated system shall have to be done by the bidder without any cost implication to BHEL. All necessary tools and tackles for PG test shall be in the bidder's scope.

13. Bidder shall submit the weekly engineering progress reports in BHEL's format and depute full project team for attending all project review meetings called by BHEL and WBPDCCL (or their consultant) without fail.
14. Bidder shall strictly adhere to the vendor list approved by BHEL/WBPDCCL. Any new vendors proposed or considered by the bidder shall be subject to the approval of WBPDCCL/BHEL. In case it is not approved by WBPDCCL then, sub-vendors are to be selected from WBPDCCL approved vendor list without any price implication to BHEL.
15. Bidder to note that time is the essence of this contract, thus they shall follow and submit the drawings as per submission schedule for the list of drgs. Indicated in this document in no. of days from zero date i.e. LOI date. No delay shall be entertained later on.
16. **Tentative list of drawings/document to be considered by bidder with schedule of submission is attached in annexure-8.** Additional list of drgs. /documents to be submitted by the successful bidder shall be finalized with WBPDCCL (or their consultant)/BHEL after award of the contract and the bidder shall furnish the drgs. /docs accordingly. Engineering drgs./doc must essentially contain the following (individual to system, equipment and items of but not limited to these and any drg./doc required desired by BHEL/WBPDCCL shall be furnished by the vendor during detail engineering:
 - a. General Arrangements Drgs., etc.
 - b. Civil Assignment Drgs. with Load Data for All the above
 - c. Various Schedules
 - d. Design Calculations
 - e. Data Sheets
 - f. Fabrication Drgs. of Chutes & Technological Structures of Machines
 - g. O&M manuals (with Complete Specification Details, Part No)
 - h. PG Test Procedures, QAP, FQP
17. Bidder shall furnish the L-2 project schedule for the complete project indicating various milestones and constraints along with the bid. Each successful bidder shall furnish the L-3 project schedule in line with the L-2 schedule after the award of the contract.
18. Bidder shall make their own arrangements well in advance for heavy erection equipment like bigger cranes that are required for erection of the equipment which are at higher height.
19. Bidder shall consider mandatory spares of all the machines in their scope as mentioned in the specification.
20. Receipt & unloading at site, local transportation, storage, preservation & security, shifting to erection work place, E&C of all free issue items (if any) to vendor shall be in the bidder's scope.
21. All material of construction for all equipment shall be subject to WBPDCCL/BHEL approval during detail engineering.

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22. Consumables like lubricants, oils etc. for first fill and initial operation with 10 % for topping up till handing over. Special tools and tackles, as required, commissioning spare parts, supply & application of rust preventive & paints at shop floor and at site after erection as applicable for the equipment/system shall be in the scope of package bidders.
23. Provision of any temporary supports/platforms required for E&C of Wagon Tippler including structural material shall be in the scope of the bidder.
24. Base frame and fixing/foundation bolts for all mech. equipment/items and related electrical equipment and motors shall be in the bidder's scope.
25. Necessary provisions shall be considered in the equipment/items/systems which are in other bidder's scope for integrating with other equipment/systems/items which are part of other contractor's scope.
26. Bidder to note that CHP fronts during erection will be given in a staggered manner. So, bidder has to consider and envisage mobilization of all resources required, including manpower, in the shortest time during execution time. For this the bidder has to consider advance resource planning so that erection by the successful bidder is not delayed.
27. The coal flow diagram and plot plan attached with enclosed in this specification are indicative only and doesn't show comprehensive scope of work and actual things may vary during detail engineering.
28. Bidder shall strictly adhere and follow the erection & commissioning terms and conditions as mentioned in the annexure-1.
29. All coupling guards, and guards for other parts of wagon tippler, side arm charger & indexer and apron feeder shall be in the scope of the bidder.
30. During detail engg. bidder to strictly adhere to BHEL/WBPDC drg. formats, document numbering, QP & FQP formats.
31. Painting of all the equipment shall be as per specification mentioned in **WBPDC general technical requirement VOL-IIA SEC-V, cl.no. 14.00.00 & 15.00.00.**
32. Cleaning of any debris produced by the bidder during E&C shall be done immediately at each front.
33. Rust preventive after inspection at shop floor before dispatch shall be in the bidder's scope.
34. **The design, manufacturing, inspection and testing of the equipment shall comply with all the currently applicable statutes, regulations and safety codes in the locality where the equipment is to be installed and shall also confirm to the latest edition of the Indian and other international standards and codes. Nothing in this specification shall be construed to relive the contractor of the required statutory responsibility. In case of any conflict & ambiguity in the standard to be followed, the decision of the customer shall be final and binding.**

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05.00.00 TECHNICAL SPECIFICATION OF TWIN WAGON TIPPLER

05.01.00 Twin Wagon Tippler & Accessories

05.01.01 Twin Wagon tippler shall be a simple and compact machine with low drive power. It unloads two wagons at a time by inverting the loaded wagon over a ground hopper and discharges material into the ground hopper located beneath the Tippler. Equipment shall also be designed to unload single wagon.

05.01.02 Twin Wagon Tippler shall be complete with:

- Tippler Table with rails, end frame with necessary rack segments, clamp girder, side beam etc.
- Twin wagon tippler hydraulic drive with cylinders, power pack, necessary hoses etc.
- Hydraulic clamping system with cylinders / power pack, necessary hoses etc.,
- All foundation bolts.
- Control Cabin where from the Twin wagon tippler and Side Arm Charger & Indexer can be operated jointly or independently.
- Any other item / accessory / fixtures to complete supply of the equipment.

05.01.03 Twin wagon tippler shall be provided complete with all structural members, tippler platform, tipping mechanism, tippler drive, brakes, coupling, shafting and all automatic controls for positioning, tipping, discharging the contents of entire wagon into the Wagon Tippler hopper.

The tippler shall be of proven design and suitable for continuous duty operation of 24 hours per day.

05.01.04 The design, manufacture, inspection and testing of Twin wagon tippler shall comply with all the currently applicable statutes, regulations and safety codes in the locality where the Wagon Tippler is to be installed. The Twin wagon tippler shall be built in accordance with the latest requirements of RDSO Technical Pamphlet G-33, Rev. No.01. Type test/approval by RDSO shall be carried out as per requirement of RDSO. All statutory approvals are in the scope of contractor including payment of all fees/documentation etc.

05.01.05 Structural steel will conform to Grade E350 / E250 of quality (A/BR/B0), Semi killed / killed as per IS: 2062 (latest) for rolled steel members or plates. For Crane Girder Steel will confirm to Grade E350 / E250 of quality C (Killed). All structural steel plates and sections shall be either of "SAIL" or "TATA STEEL" or "RINL" or "JINDAL" make or vendor approved by WBPDCCL.

05.01.06 Wagon Unloading System

- (1) The rake comprising of 60 no. of wagons shall be pushed into the reach of in-haul equipment by a locomotive. Further placing of wagons over tippler platform and carrying away the empty wagons shall be accomplished with the help of a Side arm charger & Indexer.
- (2) The Twin Wagon Tippler shall be used for unloading of ROM coal from wagons into the RCC hoppers. It shall also perform function of weighing the gross & tare weight of wagons by incorporating an integral weighbridge. Twin Wagon Tippler shall be of sturdy and robust construction. Tippler is provided with the safety features such as ultimate shunt limit, over travel limit switches or equivalent etc., so as to operate the tippler safely without damaging the railway wagons, integral weighbridge etc.
- (3) Maximum moving dimensions of locomotive & wagons as per Indian Railway norms shall

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be adopted for providing clearances with respect to structures, equipment and tippler arrangement.

05.01.07 **Design Parameters**

- (1) The design and construction of components of tippler and auxiliary handling equipment coming into contact with any part of wagon shall be such that no damage whatsoever is caused to the wagon equipment or its paint.
- (2) The side supports for tippler shall meet the following requirements
 - (a) The side support shall consist of a longitudinal beam, which shall be as long as the longest wagon to be tippled. This beam shall be continuous.
 - (b) The side support shall be articulated so that it can take the tapered as well as parallel stanchions on the body of the wagons. Alternatively, the cradle shall be articulated on trunnion to achieve this.

There shall be metal to metal contact between the side support beam & the side stanchions of the wagon i.e. no rubber pad or any other alternative, shall be provided on the contact face of the side support beam.
 - (c) The side support beam shall be movable type, the movement being done by hydraulic arrangement. (No external or moveable counter weights should be used with the side support beam)
 - (d) Pressure gauge/s shall be mounted, at easily accessible location for reading the hydraulic pressure for side support hydraulic arrangement.
- (3) The top clamping arrangement shall conform to the following requirements.
 - (a) The top clamping pressure shall be such as will hold the wagons firmly in position on rails and keep the running gear from getting dislodged without causing any deformation to the wagon structure.
 - (b) Top clamp locks should include a wagon bogie spring relief mechanism for permitting release of forces generated by the re-exertion of bogies springs during unloading of wagon.
 - (c) Top clamping arrangement shall be of longitudinal / transverse type and provided with self-aligning feature.
 - (d) Minimum 50mm thick rubber lining on top clamp pads shall be provided. The shore hardness of the rubber pads shall be at least 70A.
 - (e) Forces exerted by top clamps of the tippler on wagons copings shall be within permissible limits /as per RDSO, G-33, Rev. No. 01.

05.01.08 **CONSTRUCTIONAL FEATURES**

- (1) Twin Wagon Tippler shall be built in accordance with latest standards and the recognized safety rules.
- (2) Operator is positioned behind the Twin Wagon Tippler control Desk inside the operator's cabin to monitor the unloading process and shall intervene whenever necessary.

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(3) The following are the main components of Twin Wagon Tippler:

- 1) Tippler drive unit
- 2) Entry & Exit End frame with open segmental gear rack
- 3) Tippler platform
- 4) Clamp girder
- 5) Side Beam
- 6) Operator Cabin
- 7) Moving Side Support Beam
- 8) Brakes
- 9) Tip Side and off Side Clamp gears
- 10) Support Rollers
- 11) Photocells and limit switches
- 12) Main Hydraulic Cylinders
- 13) Main Bearing and Main Shaft
- 14) Wagon Holding Paw Cylinders
- 15) Cantilever arms
- 16) Centering Device.
- 17) Wheel Grippers
- 18) Retractable wheel chocks.

(4) Tippler consists of end frame and a corresponding supporting structure. The supporting structure of the tippler is designed as a tippler platform placed on a concrete civil foundation through a centering device. The Platform supports the Wagons, which rotates along with End frame.

(5) The Wagons are held in position during rotation by means of Top Clamping Beam, (which is hydraulically operated) and side support beam. The hydraulic power unit is housed in a shed near Twin wagon tippler.

(6) Metered quantity of the material (which is dumped into the hopper) is discharged on to the conveyor system through Apron Feeder located below the hopper.

(7) **Twin Tippler Drive Unit:** Low speed Hydraulic motor drive shall be provided.

The drive unit consists of the following components;

- Frame for mounting of hydraulic motors.
- Hydraulic power pack.
- Drive pinions for rotating End Frame.
- Twin wagon tippler shall be driven by hydraulic motors.

(8) **End Frame:** End frame should be in a sector form and same should be fabricated out of plate works. This should be roughly of semicircular shape and rotates on main pedestal bearings supported on the R.C.C. pedestals. A cantilever arm should be fixed at the bottom of each of the sectors through this cantilever the end frame are connected to the main table via Bearing Eye. End frame shall be having toothed rim on its periphery and these teeth are driven through a pinion mounted on the line shaft. When end frame gets its motion through pinion it moves the table and the wagon placed on it along with it.

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- (9) **Rail Platform:** The Rail Platform should be of heavy steel fabricated box section, which carries a section of standard steel rail track (60kg/m) through the structure, and is of sufficient length to accommodate the at-least two longest wagons to be handled. The Platform shall act as a bridge between the End Frames and is designed to support the heaviest wagons on a cyclic basis during unloading and the passage of locomotives on an infrequent basis as required.

In conjunction with the Side Beam and Clamp Girder, the Rail Platform acts to transmit vertical and torsional loads throughout the Cage Structure and ensures the Cage acts as a homogeneous structure during rotation. Rail Platform to End Frame connections shall be carefully designed to avoid high stress concentrations and minimise fatigue effects that are inherent in Twin wagon tipplers.

Walk and access ways should be mounted on both sides of the Rail Platform to facilitate foot traffic and maintenance activities. Bearing eye, centering device and rollers shall be provided suitably. The platform rests on civil foundation via a cup and cone type-centering device.

- (10) **Top Clamping Beam:** This structural work shall be made out of plate fabrication, and connected at the ends with Side Arms, which are supported on the main bearings.
- (11) **Side Beam:** The Side Beam shall be heavy steel fabricated box section, which connects the End Frames at the mid-vertical point. The Side Beam shall accommodate the mounting of an integral moveable Side support beam and is designed as the ultimate support for the heaviest wagons on a cyclic basis during the unloading operation.
- (12) **Operator's Cabin:**
- The operator's cabin shall be equipped with:
- The necessary control units and instruments,
 - A floor to accommodate the electric cables,
 - Air conditioners etc.
- (13) **Spill Plate:** The Spill Plate would act as a chute when the tippler discharges the contents from the wagon. It should rotate along with the rotation of the chock beam.
- (14) **Brake:** Automatic, electro-hydraulic thruster operated brake shall be provided to hold the tippler platform. The brake shall be suitable for operation & shall hold the tippler platform with wagon in case of power failure.
- (15) **LOAD CELL WEIGHBRIDGE:** Electronic Weighbridge should be provided as integral to Twin Wagon Tippler. The system shall consist of the following items: -

- 1) Minimum Six (6) No load cells/system having adequate load capacity & accuracy of ($\pm$) 0.25% with necessary upper and lower supports required for mounting the load cell. Load cell will be suitable for 150% safe over load of rated capacity.
- 2) Turnbuckle arrangement as required for ensuring a balanced position of the weighing frame on the load cell.
- 3) Electronic Unit suitable for system.
- 4) The printer having provision for recording minimum following information/data
 - Gross weight,
 - Tare weight,

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- Net weight,
- Date and time of weighing gross weight,
- Date and time of weighing tare weight,

Permissible speed of Loco: As per RDSO G-33, Rev-01 requirements

05.01.09 **Marking:** All tippers shall be marked permanently and legibly at a clearly visible place with the name of the manufacturer, serial number, year of manufacturer, type and capacity of tippler and RDSO allotted Serial No.

05.01.10 **Train & Wagon Holding Devices**

- (1) **Wheel grippers** shall be designed so that balanced pressure is applied on both sides of the wheel rim. It shall have a floating arrangement so as to ensure that force on each gripper is same and shall have some lateral float so that it can take a new position in case of variation in wheel gauge. Wheel grippers shall be free horn serrations or any such provision on its holding face wheel grippers shall be made of soft material.
- (2) **Retractable wheel chocks** shall be designed so that flange of the wheel is not contacted while blocking tread of the wheel. Shape or the choke shall take into account the wheel incline, so that a line contact is made with the wheel.

(3) Clicking stops: These are not acceptable

05.01.11 **The design of the top clamping arrangement shall fulfil the following requirements**

- (1) The top clamping of the wagon shall be done through hydraulically locked top clamps. No external or moveable counter weights shall be used with the hydraulic clamps.
- (2) Top clamps should engage when the wagon tilts by more than 15 degrees. Top clamp locks shall include a wagon bogies spring relief mechanism for permitting release of bogie springs.
- (3) Top clamps should exert the bare minimum pressure on the top coping of the wagon, so as to just keep it in position. The pressure exerted by the top clamps at the tilt angle of 160 degrees shall be just enough to bear the weight of the empty wagon. Wagon bogie springs shall be fully relieved in the position, through the bogie spring relief mechanism.
- (4) The design of Top Clamping arrangement shall be of longitudinal / transverse type and provided with self-aligning feature whereby the load is borne on the top at each of the wagons. The longitudinal / transverse type clamping shall have six transverse top clamping beams i.e. the bearing face of the beam shall contact the top of the wagon at 12 locations six on each side).

Each bearing face shall contact the top of the wagon over a width of not less than 250 mm and shall be provided with rubber pads or suitable alternative not less than 50 mm thick.

- (5) The side supports for tippers shall meet the following requirements.

Full face contact between the side support beam and the side stanchions shall be ensured. The side supports shall extend to a height of 1000 mm upto 2950 mm from rail level, i.e. contact the side of the wagon over a width of not less than 1950 mm.

Pressure gauges should be mounted at easily accessible location for reading the hydraulic pressure of the side support hydraulic arrangement.

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05.02.00 Wagon Tippler Hopper (WTH-2A/2B)

05.02.01 Each tippler hopper shall be in RCC Construction with minimum sloping angle of 60°

05.02.02 Wagon Tippler Complex # WTC-2

- (1) Individual RCC hopper shall be provided for each tippler i.e. there are two (2) nos. wagon tippler hopper each having water filled volume of 225 m³ to cater coal feeding from the twin tippler. Necessary covered ramp shall be provided so that Bobcat S-450 or equivalent machine can access hopper top and operate for removal of oversize lumps of shale, sand stone which come along with ROM coal.
- (2) Further, bidder will have to ensure movement of the said equipment at hopper grid level. Supply of one Bobcat or equivalent machine shall be under bidder's scope.
- (3) It shall be provided covered with structural steel shed with precolor side cladding and with EOT crane as specified. Also access shaft / equipment hatch with necessary monorails with hoist to bring out underground equipment/ components (for maintenance purposes) up to ground level & vice versa shall be provided. RCC stairs for access to all underground floors shall be provided.
- (4) Tippler complex layout shall ensure satisfactory crane operation in conjunction with various hoists provided for the Tippler Complex. Tippler complex shall be designed taking due care for vent duct
- (5) layout / sump pump piping / underground monorails & hoist etc.
- (6) The steel grating/ bar Grid above tippler hopper shall allow passage as well as be able to withstand the load due to passage of bulldozer/payloader, weighing up to 36t. Also bar grid shall be designed so that manual breaking of oversize coal can be carried out suitably and safely above the grid.
- (7) Suitable shear beams shall be provided in tippler hopper to reduce coal column load on apron feeder. Beam surface which comes in contact with material shall be lined with 50
- (8) Bidder to note that Main Line outside boundary and boundary wall cannot be disturbed during excavation. Necessary precaution shall be taken during designing of WT Complex.
- (9) FGL for Railway Merry go round is to be considered as 34.0 M.
- (10) Necessary ramp/ access shall be provided so that Bobcat S-450 or equivalent machine can access hopper top and operate for removal of oversize lumps of shale, sand stone which come along with ROM coal. Further, bidder will have to ensure movement of the said equipment at hopper grid level. Supply of one Bobcat or equivalent machine shall be under bidder's scope.

06.00.00 TECHNICAL SPECIFICATION OF SIDE ARM CHARGER & INDEXER

06.01.00 Side Arm Charger & Indexer shall be furnished complete with travel rails, drive equipment and associated accessories.

06.02.00 The Side arm charger & Indexer shall be used for wagon positioning at the Twin wagon tippler for unloading of coal. It shall be used for pushing/ pulling rake of one full coal rake of 60 wagons and locating wagon one by one on tippler table.

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06.02.01 Operation

The rake shall be brought in by locomotive either heading or pushing and placed on the pre-tipling line such that the leading wagon will be within range of the Indexer. Indexer shall haul the loaded rake on the inhaul side to bring it within the reach of Side Arm Charger. The charger shall be driven to the leading wagon, its arm shall be lowered and it shall be coupled to the two wagons of the rake. The rake shall be hauled forward by the charger near the tippler. The charger shall stop and the wagons shall be uncoupled from the rake. The charger shall then propel the leading wagons on to the tippler, automatically uncouple and shall run clear of the tippler. Its arm shall be raised and it shall travel back to the rake and the tippler shall rotate to discharge Coal into RCC Hopper. The charger shall also perform the formation of empty rake on the outhaul side. On reaching near the standing rake, the charger arm shall be lowered and shall be coupled to the rake ready for repeating the cycle. In next cycle the rake shall be drawn and the previously tipped wagons shall be ejected simultaneously. After tipping of the last wagons, the charger shall be used under manual control to eject the last wagons from the tippler, if the next wagons are not already in position. Indexer shall work in conjunction with side arm charger & achieve the desired tipping capacity of tippler.

06.02.02 Constructional Features

- (1) Equipment supply includes Side Arm Charger & Indexer with hydraulic power pack, electric supply system, supports, rack and pinion, electrics, buffer stop etc.
- (2) SAC & Indexer travel carriage with push arm shall be propelled to & fro, parallel to rake track through hydraulic motor driving through gear box & EHT brake.
- (3) Side Arm charger & Indexer shall be mounted alongside the main rail track and shall run on its rail track parallel to the main track. The SAC & Indexer track rails have a rack/spine bar drive assembly mounted between the rails.
- (4) It shall be fitted with an arm pivoted at right angles to the track capable of being raised and lowered and carrying at its outer end an automatic coupler to couple the rake.
- (5) The Charger frame shall consist of a single fabrication from rolled steel sections and plate on which every other item shall be directly mounted to form a robust and compact unit. Frame shall also include lifting lugs and these will be sized to allow lifting of the assembled SAC & Indexer within workshop and during site installation.
- (6) The Charger shall run on four (4) Cast/ forged Steel wheels mounted on anti-frictional bearings.
- (7) To resist the moment reaction of the pushing force, two pair of steel side guide rollers shall be fitted. They shall be fitted on antifriction bearings and shall have a simple lockable adjustment for true running. The side guide rollers shall run on the head of Charger running track. One of the four guide roller units incorporates a spring assembly which ensures that all four wheels make contact with the running rails.
- (8) The side arm shall be of welded construction. Raising and lowering of the arm shall be by means of a hydraulic cylinder driven through power pack mounted on the Charger frame. A standard coupler enables automatic coupling of the arm to the wagon coupler and an actuator release mechanism with a hydraulic cylinder is provided for decoupling.
- (9) Coupler proximity switches are also attached to the coupler end of the arm. These detect

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that the SAC couplers are engaged and locked.

- (10) The Indexer shall have adequate power for hauling a rake load of 60 fully loaded wagons on the rail track whereas SAC shall be suitable for 2 Nos. fully loaded wagons along with 58 nos. empty wagons, both shall be hydraulically driven by means of a pinion and land mounted rack.
- (11) A shock absorbing mechanism is mounted within the arm head to reduce the shock loading effects experienced in handling the rake of full wagons in to the plant and also pushing the empty wagons from the tippler complex.
- (12) Cushioned emergency bumpers shall be provided at the forward and return end of carriage travel run for protection.

07.00.00 APRON FEEDER

- 07.01.00 Apron feeder shall be suitable for continuous duty and shall be robust in construction. It shall be capable of absorbing shock loads due to impact of falling large size coal lumps, metallic components and other extraneous material falling from the hopper, without damaging the feeder.
- 07.02.00 The pan construction shall be such that it prevents leakage of coal dust during loading, conveying and discharging. Sufficient overlap to be provided to restrict the spillage. Pans shall be fabricated with side plates of adequate height and style suitable for installation under WT hopper. Stationary short plates shall be provided to guide coal from below the Twin wagon tippler hopper without clogging or jamming. Pans shall be structurally reinforced to take impact of lump size as specified in data sheet. The thickness of pans should be properly designed by the bidder but the minimum thickness shall be 20mm. Pan material shall be LA-55/ TISCRA/Boron steel/Cast Mn-Steel.
- 07.03.00 A suitable dribble conveyor, scraper chain type/belt conveyor or equivalent, to be provided under the return stand of the apron feeder, to collect the dust and fines dropping from the return strand, which may leak through the apron feeder pans. Material collected by the dribble conveyor is discharged back into the main stream.
- 07.04.00 Heavy duty chains should be suspended at the loading point from apron feeder to scrap the coal surges built up due to discrete discharge from each pan thereby making the discharge uniform. Steel supporting rollers to be provided in the carrying side and slack side.
- 07.05.00 The driving and driven ends with sprocket shafts shall be supported in heavy duty anti-friction bearing with labyrinth sealing for dust protection and shall have provision for external lubrication. The sprocket shaft shall be constructed of alloy steel. The design shall be sturdy and shall withstand fatigue and provide torsion stability and uniform wear.
- 07.06.00 The steel chain shall be constructed out of forged steel and shall be tractor type chain. The steel sections shall be held together by alloy steel bar pins with wheels on either side which will move on hinged rails. All sections shall be so designed that it can operate under the worst condition of operation with the wet coal, muddy coal etc. without jamming. All parts shall move smoothly.
- 07.07.00 The entire assembly of the feeder parts, the bearings, driving and driven sprockets etc. shall be housed on heavy duty structural frame with arrangement for mounting the same on RCC foundation.

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- 07.08.00 The feeder shall be provided with reliable tensioning arrangement to take care of elongation in the feeder.
- 07.09.00 The Apron feeder shall be driven by low speed high torque direct hydraulic drive without any gear box. The panel for the drive shall be housed separately in wagon tippler control room. Electric motor shall have IP-55 protection. ON/OFF operation of Apron Feeder shall be controlled from Electric Building located in Tippler Complex apart from its Local Control Panels. Speed Control shall be possible from Local Control Panel only with digital speed indication.
- 07.10.00 All drive components shall be provided with safety guards.
- 07.11.00 The Apron feeder construction shall be of an approved and proven design and shall ensure operation of feeder in an aligned motion.
- 07.12.00 Apron feeder parts shall be either lubricated for life or shall be provided with automatic centralized lubrication arrangement. Ready access shall be provided to all parts for maintenance purpose.
- 07.13.00 Inspection door with dust sealing arrangement to be provided at the head end.
- 07.14.00 Electric hoist facility/equipment hatch/removable grating covers, hand railing etc. shall be provided in each maintenance bay for Apron feeder.

08.00.00 OTHER ASSOCIATED EQUIPMENTS

08.01.00 EOT Crane

- 08.01.01 For technical and other specification of EOT crane bidder is requested to follow WBPDCCL technical specification of **MISCELLANEOUS CRANES-Vol-II -K which is included in annex-2.**

08.02.00 Civil/Structural & Architectural Specification

- 08.02.01 Design, construction of different structural and civil/architectural works shall be as per the details indicated in the relevant part of this specification.

08.03.00 PULLEYS

- 08.03.01 Pulleys should conform to IS-8531, IS-4776 Part-I, IS-1891 & BS-2890 and/or applicable International Codes.
- 08.03.02 Pulleys shall be of mild-steel construction and welded type with continuous rim and two end discs fitted with compression hubs. The shells and hubs of pulleys below magnetic separators shall be nonmagnetic (stainless steel) material including its discharge chute up to the region of separator's influence zone.
- 08.03.03 All drive pulleys should be lagged with 12 mm thick herringbone/diamond (shore hardness-60) grooved rubber and non-drive pulleys should be lagged with 10 mm plain neoprene rubber. Lagging shall be vulcanised to the pulleys.
- 08.03.04 All pulleys shall be supported with heavy duty bearings housed in horizontally split type plummer blocks each equipped with four fixing bolts and labyrinth seals to prevent ingress of dirt and moisture. Bearings shall be self-aligning anti-friction double row spherical roller bearing with detachable sleeves, check nuts, locking washers etc with split type pillow block. Minimum B-10 life of pulley bearings shall be 50,000 hours. Necessary grease nipples for high-pressure grease gun lubrication shall be provided for all pillow blocks. The grease fittings shall

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be accessible and shall be adequately piped for easy lubrication.

- 08.03.05 Adequate arrangement to release excessive lubricant pressure and to suitably drain the old lubricant shall be provided.
- 08.03.06 The pulley, shall be statically balanced after lagging to minimize vibration such that when the pulley is placed on knife edges and rotated and stopped at random, the application of a torque not greater than 1.5 Nm shall cause the pulley to move in the direction of the applied torque. All the components like lugs, end discs etc. shall be accurately machined to ensure concentricity.
- 08.03.07 Minimum pulley diameter will be selected as per IS or recommendation of Belt Manufacturers, whichever is higher.
- 08.03.08 Selection of pulley diameter, shell thickness, stiffening and shaft diameter shall be subject to approval of Owner/Consultant during detail engineering based on supporting calculation/documents will be furnished by successful bidder.
- 08.03.09 Plummer blocks shall be installed on machined plates supported on rigid frame. Adequate locating screws shall be provided for easy installation/alignment of pulleys.
- 08.03.10 The pulley shaft deflection at hub shall be maximum five (5) minutes.
- 08.03.11 The clearance between pulley and floor shall be at least 500 mm for better cleaning specially during rainy season.
- 08.03.12 The snub pulleys on each conveyor shall be located to provide a belt wrap on the drive pulleys of not less than 210° wrap.
- 08.04.00 **Hoppers, Chutes & Skirt Boards**
- 08.04.01 Hopper and chutes shall be made of materials stated in the data sheet and shall be welded construction. Mating flanges shall be bolted. Felt/Rubber gaskets shall be provided at all flanged connections. The minimum thickness of steel plate shall be as indicated in the data sheet. Non-magnetic chutes shall be 10mm thick S.S. plate (409 M). Diameter of tramp iron chute is 500mm.
- 08.04.02 Hoppers and Chutes shall be provided with necessary inspection and maintenance covers. Suitable poke holes shall be provided.
- 08.04.03 Hoppers and chutes shall be provided with hoods to arrest leakage of coal dust and suitable rubber curtains at entry and exit point of chutes.
- 08.04.04 Floor cleaning chutes shall be provided in the crusher house and all transfer point.
- 08.04.05 Liners shall be applied as called for in Data Sheet on chutes and hoppers. For hoppers, liners shall be applied over all sides unless otherwise stated.
- 08.04.06 Material and thickness of liner plates shall be as indicated in Data Sheet. Liners shall be fastened with chutes or hoppers by countersunk and/or removable screws. Each piece of liner should not weigh more than 20 Kg.
- 08.04.07 Suitable columns and brackets for supporting hoppers and chutes shall be provided by successful bidder.
- 08.04.08 Chute shall be so designed such that the belt is not loaded eccentrically.

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- 08.04.09 Minimum valley angle of hoppers and minimum inclination of the chutes shall be as stipulated in Data Sheet.
- 08.04.10 Long chutes guiding flow from considerable height shall be provided with impact plates wherever change in direction takes place.
- 08.04.11 The chutes shall be liberally sized to avoid choking problems. Capacity of chutes to be adequate to hold the dumped material due to difference in coasting time of preceding and succeeding conveyors. Necessary calculations to be furnished by bidder in support of the above. However, during selection of brake accumulation of coal in chute should be minimized.
- 08.04.12 The smaller dimensions of the chute cross-section shall not be less than twice the lump size for raw coal. The cross-sectional area of chute shall not be less than five (5) times of material flow area.
- 08.04.13 Suitable provision in the chute, where flap gates are installed, to be provided so that gate can be taken out for maintenance without dismantling the major portion of the chute.
- 08.04.14 Chute vibrator with each limb of chute shall be considered to avoid chute jamming.
- 08.04.15 Suitable chute jam indicator shall be provided at strategic locations (also on each Leg) of chute/hoppers.
- 08.05.00 **Skirt Board**
- 08.05.01 Skirt boards shall be provided at all loading points. Minimum length of skirt boards shall be 4 M per loading point.
- 08.05.02 Skirt height for conveyors shall be 800mm (min.) upto crusher house. Skirt height for rest of the plant shall be considered as 600mm (Min.).
- 08.05.03 For belt feeders / reversible belt feeders, the skirt height to be considered as 1.0 M.
- 08.05.04 Skirt boards shall be made of steel plates having minimum thickness as stipulated in Data Sheet. Skirt boards shall be provided with top cover with necessary opening for connection of DE ducts, if applicable. Increasing gap shall be maintained between skirt plate and belt towards direction of flow. Bottom of the skirt board shall be fitted with moulded rubber strip (no cut belt) of thickness as stipulated in Data Sheet and shall have facility of adjusting the pressure for easy replacement. Shore Hardness of rubber plates should be 45 to 55. Skirt arrangement shall be self-adjusting latest design of approved make.
- 08.06.00 **Safety Guards, Platforms, Clearance Requirement etc.**
- 08.07.00 Wire mesh guards for all moving equipment like pulleys, couplings, belts, chains etc. are to be supplied under the scope of this specification. The guards will be easily removable type with inspection door etc. All equipment are to be easily accessible type. If required during detail engineering stage adequate platforms are to be provided as and when necessary in order to provide greasing etc. of take-up units, pulleys/bearings etc. Walkway clearance for all buildings, platforms around equipment/conveyor etc. shall be minimum 1500mm, unless otherwise specified.
- 08.08.00 **Note:**

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- 08.08.01 Structural steel will conform to Grade E350 / E250 of quality (A/BR/B0), Semi killed / killed as per IS: 2062 (latest) for rolled steel members or plates. For Crane Girder Steel will confirm to Grade E350 / E250 of quality C (Killed). All structural steel plates and sections shall be either of "SAIL" or "TATA STEEL" or "RINL" or "JINDAL" make or vendor approved by WBDCL.
- 08.08.02 Bidder to note that list above is not exhaustive and any work required completing the system and ensuring its satisfactory running shall also be in the scope of this package bidder.
- 08.08.03 Bidder shall submit the signed and stamped copy of all the pages which constitutes this technical enquiry specification signed by authorized signatory and clearly mentioning each clause under following two categories to avoid any ambiguity in scope understanding & the scope division as a technical offer during bidding.
- a. **"accepted without deviation and considered in scope of work"**
 - b. **"Not considered in scope of work".**

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09.00.00 TECHNICAL DATA SHEET FOR CHP EQUIPMENT

TWIN WAGON TIPPLER

Sl. No.	Description	Value
11.01.00	Wagon Tippler	
	Type	Hydraulically operated only, Crescent Type Tandem Tippler
	Equipment Designation / Location	WT-2 in Wagon Tippler Complex # WTC-2
	Twin Tippler quantity, no.	One (1)
	Material of Construction of Main Parts / Units	IS : 2062
	Type of Wagons that can be Handled at a time	Suitable for all open eight wheeler box wagons (The older BOXC wagon need not be considered for the Tandem Wagon Tippler Design) of Indian Railways being used at present for coal transportation standard and design used by Indian Railways.
	Mode of Placement of Wagons	: By Side Arm Charger & Indexer
	Gross Weight of Wagon that can be handled at a time	140 Ton
	Rail Gauge	1676 mm
	No. of Tips per Hr. (Designed / Rated)	: 25 tips/hr as per RDSO, G-33, Rev. No. 01. Twin tippler shall be capable of safely unloading fifty (50) numbers of Wagons per hour on a continuous basis including hauling, pause, decoupling and weighing time etc in conjunction with side arm charger.
	Design Coal discharge rate per Tippler (Tandem type)	25x75x2=3750 MTPH
	Type of clamping	Hydraulic
	Hydraulic motor for tippler drive	Low speed high torque type
	Average Cycle Time	To Suit.
	Angle of Rotation	160 [minimum] Degree.
	Type of clamping	Hydraulic clamping arrangement, articulated
	Type of motor, brake etc.	Hydraulic motor operated by Power pack
	Diesel loco passage	Yes, allowed
	Clearance profile	As per RDSO G-33, Rev.01/ Latest Revision
	Mode of Control	Semi-automatic/manual, PLC control for remote operation & control shall be provided.
	Safety Features	All the necessary safety features shall be provided for each machine
	Lubrication Arrangement	: Motorized group Lubrication system of proven design shall be provided.

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	Special Feature	: Heavy Duty Tippler as per Proven Design, suitable for Round the Clock Duty of 24 hr per day.
	EOT crane for tippler maintenance	Required
	G.A drawing of W.T Complex	Bidder to furnish along with offer.
	Tests	
a	All tests as per relevant codes and standards.	
b	All tests as per Manufacturer's standard.	
c	All tests as per approved Quality Assurance Plan.	
11.02.00	SIDE ARM CHARGER & INDEXER	
	Type	Rail Mounted, Rack & Pinion Type
	Qty. & Equipment Designation No.	One (1); SAC-1 and INDEXER-1
	Type of wagon to be Hauled	All open types as per RDSO, G-33, Rev. No. 01.
	Capacity of Indexer	Suitable for a rake load of 60 fully loaded wagons
	Capacity of Side Arm Charger	Suitable for 2 fully loaded wagons along with 58 empty wagons,
	Duty Continuous	24 hr/day
	Operating Speed (Forward & Reverse)	Forward: ~ 0.6 m/s (To Suit) ; Reverse: ~1.2 m/s (To Suit) However travelling Speed shall be to suit tippler capacity
	Maximum Pull of Inhaul	To Suit 60 Nos. Loaded Wagon
	Tractive force	To be designed considering actual rail layout. The existing rail layout drawings and railway siding report will be provided during detailed engineering.
	Mode of Control	Semi-Automatic from Remote Control & Local
	Mode of Power Supply	Festooning Cable Arrangement
	Drive Arrangement	Hydraulic motors (operated by Power Pack) driving a set of pinions onto ground drive rack.
	Safety Features	: Over Travel Protection / other safety features as necessary shall be provided for safe operation
	Arm Raise / Lower Arrgt.	Hydraulic cylinder operated by Power Pack
	Type of Lubrication Arrangement	Manual centralized or better
	No. of Carriage Wheels	4 Nos. / To Suit
	Track Gauge (approx.)	: To Suit
	Length of Track (approx.)	: To Suit
	Location of Control Desk	: Duly covered control desk
	Detail of Color Signal lights provided for Loco Operator's guidance	Red & Green Light
	NOTE:	

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	(i) Indexer & Side Arm Charger shall work together in order to achieve desired tipping capacity of tippler.	
	(ii) Indexer & Side Arm Charger construction shall be of proven design.	
	Tests	
a	All tests as per relevant codes and standards.	
b	All tests as per approved QAP.	
11.03.00	APRON FEEDER & DRIBBLE FEEDER	
	Location	Beneath Wagon Tippler Hopper
	Duty	Continuous
	Capacity of Apron Feeder	1500 / 1650 TPH rated & designed.
	Capacity of Dribble Conveyor	150 / 165 TPH rated & designed
	Capacity variation range	20% to 110% of design capacity
	Number required	Two (2) Apron Feeder & Two (2) Dribble Feeder
	Material to be handled	ROM Coal
	Max. lump size	(-) 300mm
	Moisture content (max.)	20%
	Bulk density of material	0.8 T/M3 for volume calculation. 1.2 T/M3 for structural design calculation.
	Centre to centre distance	By bidder
	Pan width	By bidder
	Pan speed	12 M/min. (Maximum)
	Drive	Direct Hydraulic drive without gear box.
	Tension mechanism	Heavy duty screw type
	Lubrication	Centralised single point grease lubrication
	Type of conveyor for dribble material	Belt conveyor/Scraper chain conveyor.
	Drive margin over design capacity	20%
11.04.00	INTEGRAL WEIGHBRIDGE	
	Location	Integral to Twin Wagon Tippler
	Type, accuracy & capacity	Integral electronic load cell. Minimum Six (6) No load cells/system having adequate load capacity & accuracy of ($\pm$) 0.25% with necessary upper and
	Nos. required	Suitable for Twin Wagon Tippler
	Weighing position	Static. However, turnbuckle arrangement as required for ensuring a balanced position of the weighing frame on the load cell
	Display & output	Microprocessor based control unit with digital indication and print out. The printer having provision for recording minimum following information/data - Gross weight,

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		- Tare weight, - Net weight, - Date and time of weighing gross weight, - Date and time of weighing tare weight, Permissible speed of Loco : As per RDSO G-33, Rev-01 requirements
	Location of control console	Twin Wagon tippler control room
	Tare weight determination	Automatic & manual entry
	Type of wagon	All types of box wagons of Indian railways
11.05.00	E.O.T. CRANE	
	Crane capacity	
	Main / Auxiliary hoist	20 T / 5 T.
	No. of crane	One (1) No. in Wagon Tippler complex.
	Span	As per requirement.
	Crane classification	Mechanical – Class-II as per IS-3177 & IS-807.
	Motor	
	Motor duty	S-4 as per IS-325
	C.D.F.	40%
	Starts per hour	100
	Test Load –	
	Main hoist	As per IS-3177.
	Crane structure	Box girder/lattice etc.
	Platform	One side.
	Clear width	750 mm.
	Operating speed –	
	Main hoist	3.0 M/Min. $\pm$ 10%.
	Cross travel	10.0 M/Min. $\pm$ 10%.
	Long travel	15.0 M/Min. $\pm$ 10%.
	Length of run way conductors	As per requirement.
	Type of down shop lead	Flexible.
	Lift of main hook	Twin Wagon Tippler, Apron Feeder & Conv. Floor.
	Brakes type	
	Main hoist	E.H. thruster.
	Cross travel	D.C. E.M. Brake.
	Long travel	D.C. E.M. Brake.
	NOTE :	
	The equipment shall be complete with all standard parts and accessories which are required for safe and trouble-free operation of the plant but not specifically mentioned in this specification.	
	All safety feature, as required, shall be included.	
	A mechanical locking arrangement shall be provided to prevent rotation of hook.	

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	TEST :	
1	All tests as per relevant standards.	
2	All tests as per manufacturer's standard.	
3	All tests to meet guaranteed requirements.	
4	Deflection tests at manufacturer's works.	
5	Radiographic tests for standard welds in tensions.	
11.06.00	PULLEY	
	Service	For head & drive, head snub, bend, take-up, tail & tail-snub pulleys (if required) to be used in all conveyors, reversible belt feeders, fixed trippers and travelling trippers.
	Conveyor TPH	2200/2000 & 1650/1500 (Design/rated).
	Type of Belt, Belt Speed & Width	As per Belt Data-Sheet.
	Minm. Pulley Width	As per I.S. (Belt Width + 200 mm).
	Lagging to be provided	For all drive pulleys & non drive pulleys
	Lagging material & thickness	Neoprene rubber & 12 mm thick for all drive pulleys
		Neoprene rubber & 10 mm thick for all non-drive pulleys
	How lagging is secured	Vulcanized.
	Pulley Construction	Welded Steel as per IS-8531 (See Note also)
	Shaft Material	EN-8 or equivalent.
	Pulley Diameter	As per IS-1891 or belt manufacturer's standard whichever is higher.
	Shell thickness	Min.16 mm for Drive Pulley and 12 mm for other pulley. (Exact to be determined during detailed engineering from Belt Tensions).
	Angle of Wrap for drive pulley	210 deg.
	Crowning to be provided	Not required.
	Type of Pulley Block	Heavy duty split type with side covers.
	Type of bearing	Antifriction double-row spherical roller. (Refer Note vi)
	Type of sealing	Double Labyrinth with synthetic sealing.
	Pulley shaft diameter	Margin of minimum 20% shall be considered on maximum tension at design capacity for arriving at the shaft dia.
	Rubber for lagging	
	i) Type	Neoprene rubber.
	ii) Hardness	55 to 65 durometer (Shore A)
	Lubrication	Through Manual grease gun.
	Pulley bearing Centre	By Successful Bidder. to Centre
	Idler pulley	Adequate number of Idler type pulleys to be provided with plummer block and min. shaft dia of 65mm. The above is subject to owner's approval.

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	NOTE:	
(i)	The shell thickness and pulley shaft diameter shall be ascertained by bidder from Belt-tensions and suitable calculation shall be submitted for approval during detail engineering.	
(ii)	Adjustable screw and lock nut shall be provided on one side of pillow-blocks for aligning purpose.	
(iii)	While selecting pulley diameter due consideration shall be given to scraper location and normal distance between carrying and return belt.	
(iv)	The pulleys below inline separators shall be with rim and hub of non- magnetic SS-409 M (minimum) and chute upto the region of separator's influence zone shall also be made of non-magnetic stainless steel.	
(v)	Pulley shaft deflection at hub shall be maximum 5 minutes. Shaft shall be keyed and press-fitted.	
(vi)	Drive pulleys of reversible conveyor shall be provided with Diamond shaped lagging.	
	TESTS	
	i) Balancing Test (All pulleys shall be dynamically balanced)	
	ii) All Tests as per relevant codes and standards.	
	iii) All tests as per manufacturer's standards.	
11.07.00	GEAR BOX	
	Location	Indoor.
	Duty	24 hours/day.
	Type of Prime Mover	Squirrel cage Induction Motor, 3.3 KV/415V, 3 Ph., 50 Hz.
	Type of Rotation	Bi-directional for reversible belt feeders.
	Maxm. Ambient temperature	50 deg.C
	Minm. Ambient temperature	5 deg. C.
	Type of high speed coupling	Fluid/other as per Spec.
	Type of low speed coupling	Gear.
	Type of Gear Box	Helical/Bevel Helical – Wherever required
	Type of Bearing	Antifriction Ball/Roller.
	Lubrication	Splash.
	Frequency of Start	As per motor specification.
	Base Frame	Required.
	Material of Construction	
	Casing	Grade-FG-260 of IS-210.
	Worm, Gear & Pinion	Alloy Steel.
	Shaft	Forged/Alloy Steel.
	Type of Cooling	Natural/fan cooled.
	TESTS	
1.	Noise Level	
2.	Guaranteed efficiency	
3.	Guaranteed reduction ratio	
4.	Max. Temp. Rise	

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5.	Bearing Performance	
6.	All Tests as per relevant codes and standards.	
7.	All tests as per Manufacturer's Standards.	
11.08.00	FLUID COUPLING	
	Location	Indoor
	Position	In between motor and crusher.
	Service	Crusher drive.
	Type of drive	Sq. cage induction motor.
	Type of fluid coupling	Delayed fill type traction in LT motors of above 30 KW For HT motors actuator operated scoop type.
	Drive Power for which provided	30 KW and above
	Whether fusible plug to be provided	Yes
	Maxm. ambient temperature	50 deg.C
	Minm. ambient temperature	5 deg. C.
	Housing material	Aluminium Alloy/Steel
	Maximum slip allowable	3%
	Type of cooling	Water cooled for scoop tube type
	Semi-flexible coupling to be provided with fluid coupling	Yes, at output side with brake drum, if required.
	Hours of operation/day	24
	Maximum starting torque	Adjustable in the range of 120% to 275%.
	Direction of rotation	Should be capable of rotating in both direction.
	Balancing	Dynamically Balanced.
	NOTES	
1	Fluid coupling shall be so designed that the same can be taken out from its installed position for maintenance without shifting the motor and gear box at input and output sides respectively.	
2	Brake-drum shall be provided with Fluid Couplings, wherever required.	
	TESTS	
1.	Tests to establish torque-speed and torque slip characteristic.	
2.	Pressure tightness and leak-proof test.	
3.	Temperature rise test.	
4.	Over speed (125%) withstand test.	
5.	All tests as per relevant codes and standards.	
6.	All tests as per manufacturer's standards.	
11.09.00	HOPPER CHUTES & SKIRT BOARD	
	GENERAL INFORMATION	
	Material Handled	Coal
	Bulk density for volume calcn.	0.8 T/Cu.M
	Bulk density for weight calcn.	1.2 T/Cu.M

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	Lump Size	(-) 300mm, (-) 20mm, as applicable.
	Belt Width	1400 mm / 1600 mm.
	Maximum Moisture Content	20%
	Flow Rate	: 2200/2000 & 1650/1500 (Design/rated)
	Belt Speed (Approx.)	: 3.1 M/Sec.
	Pulley Dia	: As per IS/Manufacturer.
	Pulley Width	: As per I.S. (Belt Width + 200 mm)
	HOPPERS & CHUTES	
	Valley Angle (Minimum)	60 Degree.
	Chute Material	
	a) For Uncrushed Coal	
	i) Sliding zone & adjacent sides	20 mm thick TISCRAAL or equivalent.
	ii) Non sliding/striking Zone	10 mm thick M.S.
	iii) Chute with valley Angle 80° and above :	All four sides 20 thick TISCRAAL or equivalent.
	a) For Crushed Coal	
	i) Sliding zone & adjacent sides	20 mm thick TISCRAAL.
	ii) Non sliding/striking Zone	10 mm thick M.S.
	iii) Chute with valley Angle 80° and above :	20 thick TISCRAAL
	Discharge hood over head Pulley	4mm thick MS with rubber curtain.
	Inspection doors	Hinged and leak proof construction.
	Construction	Non striking/Non sliding plates are bolted connected with others.
	Flange	Flange joints with min. M-16 Bolts @ 150 mm L/C spacing (max.)
	Angle of chute near feed end	45 deg.
	SKIRT BOARD	
	Material of main plate	TISCRAAL
	Thickness of main plate	10 mm
	Minm. length of skirt per feeding point	4.0 M
	Skirt board height mm (min.)	800 for uncrushed coal 600 for crushed coal
	Thickness of Back Plate :	20 mm TISCRAAL
	Thickness of Rubber Strip	20 mm (45 to 55 shore hardness)
	Thickness of Top Cover	4mm MS (For discharge hood & skirt cover plate)
	NOTES	
1.	The matching flanges shall be made of rolled steel angles & bolted type.	
2.	Inspection/ Poking doors shall be provided at head-end chutes and all points vulnerable to choking. Air blasters in chute shall be provided at strategic locations, which will be subject to Engineer's approval.	

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3.	Skirt-board heights to be decided during detailed engineering as per relevant standards & considering DFS system for Dust Suppression and subject to Owner's approval.
4.	All flange joints to have suitable rubber gaskets.
5.	Necessary openings for DE/DS System to be provided as per relevant part of the specification.
6.	Minimum chute cross-section shall be five times of actual material flow area.
7.	Chutes, which will come in magnetic separator's influence zone, shall be made of non-magnetic material (SS-409 M).
8.	Chute for tramp irons shall terminate at ground level and shall be made of minimum 10mm M.S. plate.
9.	Chute blockage switch shall be provided in all chutes.

11.10.00 WAGON TIPPLER HOPPER

Designation no. :	WTH-2A/2B
Qty, no. :	Two (2)
Hopper Capacity :	Minimum 225 cum each (Water filled volume)
Material handled :	ROM Coal/(-) 300mm
Type of Construction :	Underground RCC Construction complete with steel fabricated bar grid at top and covered with structural steel shed.
Hopper Liner :	Minimum 50 thk Guniting
Type of Feeder below Hopper :	Floor Mounted Apron Feeder
Bar grid at hopper top :	Provided
Bar Grid Type & Construction	Welded Steel Construction made out of M.S. plate/ flat (IS: 2062)
Bar Grid/ Grating Material	Made out of 200 mm x Minimum 20 mm thk MS flat
Approx. Clear opening size of grid	300mm x 300mm

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10.00.00 ERECTION, COMMISSIONING AND SUPERVISION

10.01.00 Vendor shall engage qualified Engineers/ supervisors with relevant site experience to supervise & cross-check the correctness/ compatibility of civil & structural works w.r.t E&C of Mechanical systems/ Equipments, correct implementation of their civil assignment drgs. for the civil works, for their equipment erection at site during construction (i.e. pedestal casting, footings, cutouts, pockets, gallery alignment, survey etc.), so that no issues like misalignment, run out of pockets foundations arises, also a joint protocol to be prepared for record.

- (1) For supervision of Erection & Commissioning, trial run & PG test, handover, Bidder shall depute and maintain minimum two graduate engineers (consists of Mechanical & Electrical) in addition to Site-in-charge and one diploma engineers having requisite relevant experience till handing over of the systems to the customer, as per project requirement & progress.
- (2) Bidder shall depute required manpower for Stores management including one Stores supervisor & security round the clock.
- (3) At least one number qualified graduates for site commercial coordination shall be made available at site for utilizing their services by BHEL, if not complied BHEL will engage directly and recover monthly charges as per commercial part of the enquiry specification.

The same shall be increased as per requirement at site during full-fledged erection. In case of any additional manpower required, bidder shall arrange the same for smooth E&C activities.

Vendor to ensure sufficient manpower throughout the project for parallel engineering, erection and commissioning activities on all equipments, systems etc. Bidder shall depute continuously and maintain minimum no of engineers and supervisors at site for supervision of E&C, coordination and commercial activity for the package.

Bidder has to give their organization chart for the site activities along with the offer.

NOTE:

In case Vendor fails to maintain the minimum manpower /site staff at site till project completion, suitable pro-rata deductions as per BHEL prevailing rates, shall be recovered from the vendor.

10.02.00 Open & Closed Storage Yard (Bidder's scope):

- 10.02.01 Bidder to include in their package design & construction of 1 no. semi- permanent store shed for storing his items/ equipments as per his scope of work. The closed store should have brick wall side covering, GI sheet roof covering & rolling shutters & windows as per BHEL's approval. Bidder shall ensure that the size of the closed storage shed is capable of storing heavy equipments required for this package and shall be suitable for movement of hydra. Approx. size of closed store shall be 80 sq.m.
- 10.02.02 Bidder to include in their package open storage yard suitable for storing package items and BHEL free issue items if any. Bidder has to do open yard preparation and consolidation of subgrade with power road roller of 8 to 12 MT capacity after excavating earth to an average of 15 cm depth, dressing to camber and consolidating with road roller including making good the undulations etc. and re-rolling the sub grade and disposal of surplus earth with lead upto 50 meters and leveled with required fencing and security at stores (round the clock). Required

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concrete sleepers for keeping the equipment & tarpaulin cover to be arranged for outdoor storage of outdoor equipments shall be arranged by bidder.

10.03.00 GENERAL REQUIREMENTS OF E&C

- 10.03.01 Bidder to note that erection fronts may be given progressively in a staggered manner. So, Bidder has to consider and envisage mobilization of all resources required, including manpower, in a shortest possible time during execution time. For this bidder has to consider advance resource planning so that erection by the successful bidder is not delayed.
- 10.03.02 Bidder shall make their own arrangements well in advance for heavy erection, equipments like bigger cranes that are required for erection of equipments which are at higher height.
- 10.03.03 **Painting of all equipments/ items which are in bidder's scope at site after erection & commissioning as per painting schedule provided by customer in general technical requirement vol-IIA sec-V, cl.no. 14.00.00 & 15.00.00.**
- 10.03.04 Vendor should strictly adhere to the BHEL's HSE manual and comply to these norms during site erection and commissioning.
- 10.03.05 Bidder shall furnish details of Foundation and grouting for machines/ equipments included in this package including BHEL/BHEL's other vendor free issued items.
- 10.03.06 Supply of grouting cement and grouting of all mechanical equipment/ items and its drives base shall be in bidder's scope. BHEL shall provide only the foundation pockets for pedestals (wherever necessary) as per GA drgs of the bidder and grouting of all mechanical equipment/ items and its drives base shall be in the bidder's scope only.
- 10.03.07 Supply of all insert plates in concrete shall be in Bidder's scope.

 Bidder to mention the requirement of the same clearly in their respective GA drgs. And it will be erected by BHEL with the supplied plate of bidder. If not mentioned in the respective drg. and if any required later stage same will be modified and erected by bidder.

 Later on, no claims from bidder shall be entertained that civil pedestal casting, footings, cutouts, pockets etc are not in order or not as per their drg. and if it exist then these shall be rectified by the bidder at their own cost and any delay on account of this shall be attributable to respective package bidders.
- 10.03.08 Supply and Fixing Foundation/ anchor bolts for base plates of all apron feeder & other equipments (for steel to steel and for steel to concrete) including other necessary items shall be in bidder's scope.
- 10.03.09 Supply of base frame and fixing foundation bolts for all mech. Equipment / items, other related electrical equipments and motors shall be in bidder's scope.
- 10.03.10 Design, Supply, E&C of Ladders, maintenance platforms for inspection of skirt, poke holes etc. and required supports for the same shall be in bidder scope.
- 10.03.11 Minor chipping i.e. up to 50mm thick, micro leveling, and providing shim plates for erection of equipment/items shall be in bidder scope.
- 10.03.12 Provision of any temporary supports/ platforms required for E&C of Mechanical Equipments/ items shall be in the scope of Bidder.

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- 10.03.13 Base frame and fixing/ foundation bolts for all Mechanical Equipments/ items and related electrical equipments and motors shall be in Bidder's scope.
- 10.03.14 Cleaning of any debris produced by the bidder during E&C shall be done immediately at each front. The bidder should remove all the technical waste in CHP area after each maintenance and operational activities to keep the place clean and according to the satisfaction of BHEL Engineer in charge within 3(three) days after completion of work, failing which BHEL will get the cleaning done at the risk and cost of the bidder.

NOTE:

- (1) All steel structures shall be fabricated in factory, transported and erected at site. All structures shall have bolted field connections.
- (2) Please refer attached File for complete Erection Condition of Contract from WBPDCCL. Bidder shall strictly adhere to the same and follow the erection & commissioning terms and conditions as mentioned in the enclosed file.

10.04.00 FACILITIES TO BE PROVIDED BY THE OWNER

- 10.04.01 Land, free of charge as available for the construction of plant.
- 10.04.02 Construction water will be provided at free of cost at single point. Further distribution shall be arranged by bidder.
- 10.04.03 Construction Power will be provided by bidder on chargeable basis. Power supply at one (1) point at 11 kV AC $\pm 10\%$, 3 Ph, 50 Hz. $\pm 5\%$ near the erection site shall be made available. For further distribution, supply of transformer & ACDB / MCC, energy meter shall be in the bidder scope. Any other voltage, if required for any operation during construction, shall be arranged by the Contractor from above source of Power supply.
- 10.04.04 Bidder shall quote, in the price bid, quantity of construction power and commissioning power required by him till first synchronization of the unit.
- 10.04.05 **For details erection conditions of contract bidder shall refer WBPDCCL Lead Specification vol: IIA, WBPDCCL General Conditions Vol-1: Section-3 and WBPDCCL Special Conditions for Erection and Construction Vol-1: Section-4.**

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11.00.00 OPERATION AND MAINTENANCE TILL HANDING OVER

11.01.00 Scope of Operation & Maintenance (O&M) of the Coal Handling Plant:

- 11.01.01 The Vendor shall be responsible to carry out the “round the clock trouble free operation” of all the machines under this Machine Package-A for a period of 300 shifts. Each shift shall be of 8 hrs. The time calculation shall be based on the coal feeding to the bunkers while plant is in operation and the shift will not be counted when power plant is not in operation.
- 11.01.02 Prior intimation for start of coal firing shall be given to bidder two days before. The above stated 300 shifts shall not be continuous and shall be unequally distributed over a span of 18 months from first coal firing date of the unit. If the equipment is handed over to customer before completion of 300 shifts the bidder will be paid only for the completed shifts on prorated basis. Bidder’s O & M service as required beyond 300 shifts shall be as per the add-on price quoted by the bidder at the time of order finalization.
- 11.01.03 Coordination with Conveyor Pkg. vendor for his O&M during coal unloading, is in the scope of bidder.
- 11.01.04 Vendors to note that all consumables/ oil& grease/ tools tackles/ manpower required during the period of O &M, shall be included in the scope of Vendor and no additional payment will be made by BHEL in this regard.
- 11.01.05 All other consumables (gasket, rope, diesel, rustoline, waste cloth, lapping paste, jute, emery papers, welding electrodes, grinding wheel, hacksaw-blade, cutting gas, Electric items like Insulation Tape, Lugs, Fuses, Push Buttons, Electrical contact cleaner etc.) required shall be in the scope of the bidder.
- 11.01.06 All tools, tackles, viz chain pulley block, pulling & lifting equipment, Trolley, Crane, Hydra, Truck, Trailer, winch, wire rope, grinding machine, sling, D-shackle, Coupler etc. including precision measuring instruments, welding machine & single phase portable welding machine that may be essential to execute the job shall be arranged by the bidder at no extra cost to BHEL.
- 11.01.07 For electrical job, Megger (1 no.), Multimeter (02 nos.), Clamp meter (1 no.), Tester and screw driver set (02 nos.), Spanners/Pliers/Small tools kit (1 set)/Crimping tools for power and control cables/ cutter (2 nos.)/ wire stripper (2 nos.)/Blower to be arranged by the vendor at no extra cost to BHEL.
- 11.01.08 Necessary shifting of materials, spares, equipments etc. from store to work site and unserviceable materials from work site to store/yard, will be in bidder’s scope.
- 11.01.09 The vendor must have adequate resources to undertake routine, preventive maintenance jobs of Machine Package-A items. They should have adequate resources to mobilize the site for carrying out three to four jobs simultaneously without any delay.
- 11.01.10 Vendor has to compulsorily maintain log book for the O & M staff engaged for O&M jobs and submit to Engineer in charge for certification for realization of the bills. After certification of the bill by Engineer in charge of BHEL, bidder shall claim the amount after completion of minimum 100 shifts.
- 11.01.11 Top up of oil/grease/lubricant as required during operation of plant shall be done by the bidder.
- 11.01.12 Housekeeping: Cleaning of all equipment and housekeeping to be carried out dedicatedly in

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total area of work for the vendor and its office premises.

- 11.01.13 All routine, preventive, predictive and breakdown maintenance of equipments of Machine Package-A.
- 11.01.14 Fabrication and erection of platform/extra support in WT area if felt necessary during operation and maintenance of the equipments has to be done by the bidder. Materials like channels, beam, angle etc as required shall be supplied by bidder.
- 11.01.15 To maintain the daily Maintenance log book in which details of overhauling / breakdown/maintenance of any equipment including replacement of spares/components to be recorded. Recording of any abnormality of equipments, malfunctioning of system of the WT, SAC, AF machine also to be noted in the Log book and informed to the Engineer-in-charge of BHEL ISG for initiating immediate corrective action by the vendor.
- 11.01.16 **In case package vendor does not engage required O&M staff with tools/tackles/qualification as specified in the specification, alternate O& M staff shall be engaged by BHEL at their risk and cost on monthly basis for a minimum period of 300 shift and amount incurred shall be debited from the package vendor's bills.**
- 11.02.00 **Minimum Manpower requirement for O&M of the Machine Package-A equipments:**

Sl. No.	Manpower	Nos.	Remarks
1	Engineer or Supervisor (Mech. /Elect.)	1	In each shift
2	Console Operator	1	In each shift
3	Electrician cum Field Operator	1	In each shift
4	Technician /Fitter (Mech.)	1	General shift
5	Rigger Skilled	1	General shift
6	Helper	1	General shift

Note:

- The above list is minimum manpower required for O&M. In case additional manpower required for carrying out O&M, same shall be supplied by the vendor without any extra cost implication to BHEL.
- The vendor shall take approval from Engineer-in charge of BHEL by submitting organization Chart of O&M staff for this site clearly indicating man power deployment with their educational background & experience with supporting documents.
- EPF provisions for the workers shall be made by the bidder as per rule. Relevant documents regarding EPF for the workers of the bidder shall be submitted to the concerned authority before commencement of work.
- The vendor shall be solely and wholly responsible for safety and security of workers engaged in the job and the BHEL property. In case of any accident the vendor shall pay proper compensation to the workers as per workmen's compensation act and repair/replace BHEL property at their own cost & arrangement. The bidder shall also make adequate provision of insurance for their workers at their own cost to cover them against the risk of accident.
- The vendor and their workers engaged in the job shall follow all safety rules at the time of execution of work. It shall be the responsibility of the bidder to supply all safety equipment as necessary to its O&M staff.
- The vendor shall comply with all laws, rules & regulations of the land including but not limited to, i) Labour rules & Acts, ii) Factories Act, iii) Minimum wages Act, iv) Payment of Wages Act, v) Bonus Act, vi) EPF rules, vii) Contract Labour (Regulation & Abolition) Act as in vogue or comes

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into vogue from time to time. BHEL will be kept indemnified against any claim arising out of non-compliance of such Acts/rules.

- 7 The vendor shall not pay less than minimum wages to the workers under the Minimum Wages Act and the Govt. rules made there under subject to revision from time to time. The payment will be made to the workers in presence of the authorized representative of BHEL. The monthly payment is to be made on the 7th day of successive month. The bidder may change the place and time of payment to his workers under intimation to Engineer in charge of BHEL.
- 8 BHEL shall not be responsible in matters of employment of workers engaged in the job at any point of time. The bidder shall be fully responsible for his workers with regard to terms of employment of services. BHEL shall not be held responsible in any manner, whatsoever, in respect of workers engaged by the vendor for carrying out the works at site. Regarding engagement of workers preference should be given towards experienced and competent workers with bonafide testimonials.
- 9 Beyond general shift if any trouble/breakdown occurs in the plant, Maintenance team must reach the plant without any delay along with Engineer/Site Incharge.
- 10 No Person from the list of manpower shall leave the plant site without prior permission from the Engineer in charge of BHEL.
- 11 However, in operation part, if any person is absent, substitute must be given immediately.
- 12 The replacement / substitute personnel for maintenance, manpower shall have the same educational qualification and experience.
- 13 If any additional manpower is required during O&M whatsoever under the scope of contract the same shall be made available by bidder in time within the cost. To cater the need of time bound maintenance jobs, the bidder shall depute additional manpower without any cost implication to BHEL.
- 14 During execution of work if any personnel is found not suitable for the job or his presence inside powerhouse premises is felt undesirable, the personnel has to be replaced within 15 days.
- 15 BHEL will not be responsible for payment towards idle labour charges.

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12.00.00 TOOLS AND TACKLES

- 12.01.00 Supply of special Tools and Tackles are included under the BIDDER'S SCOPE OF WORK.
- 12.02.00 The bidder shall furnish a complete and new set of all tools and tackle which are necessary for erection, commissioning, maintenance and overhauling of any of the equipment/system provided under this specification apart from the customer's list mentioned in WBPDCCL Technical specification.
- 12.03.00 The bidder shall furnish an unpriced list of such tools and tackle included under the scope of supply with the technical part of proposal along with price break up for review of Plant Owner/Consultant.
- 12.04.00 Tools shall be shipped in separate containers clearly marked with the name of equipment for which they are intended.

13.00.00 SPARE PARTS

13.01.00 General

- 13.01.01 The Contractor shall indicate and include in his scope of supply all the necessary start-up, commissioning and recommended spares in addition to mandatory spares as specified in the specification. The Owner reserves the right to buy any or all mandatory and recommended spares. The contractor shall also state for each item of spares both mandatory and recommended the normal expected service life.
- 13.01.02 All spares supplied under this contract shall be strictly interchange-able with the parts for which they are intended to replace. The spares shall be treated and packed for long storage under the climatic conditions prevailing at the site, e.g. small items shall be packed in sealed transparent plastic bags with desiccators' packs as necessary.
- 13.01.03 Each spare part shall be clearly marked or labeled on the outside of the packing with the description. When more than one spare part is packed in a single case, a general description of the contents shall be shown on the outside and a detailed list enclosed. All cases, containers and other packages must be suitably marked and numbered for the purpose of identification.
- 13.01.04 All cases, containers or other package are liable to be opened for examination as may be considered necessary by the Engineer.
- 13.01.05 All mandatory and recommended spares shall be delivered to site at least two months before the scheduled date of the trial operation of the plant. However, they shall not be despatched before the despatch of the associated main equipment.

13.02.00 Mandatory Spare Parts

- 13.02.01 The Owner considers some of the spares are essential for running the equipment irrespective of whether they are included in the list of recommended spares by the Bidder as mentioned below. Since the components involved cannot be foreseen at the bidding stage, only broad requirements of the Owner in this respect are outlined hereinafter. The Bidder shall include in his proposal, on the basis of these guidelines, an item-wise list of all components and the quantity, unit prices & total price thereof, offered as mandatory spares for each and every equipment. This list shall be separate from the list of recommended spares and shall be used for bid evaluation purposes. Any clarification in this respect may be obtained by the Bidder at the pre-bidding stage. Where the spares are indicated as a percentage and result in a number

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plus fraction, the same shall be converted to the near higher whole number. The mandatory spares should be supplied to the Owner at least one month before the trial run. The despatch program is subject to approval of the Owner/Consultant after award of contract.

13.02.02 The prices for mandatory spares must be given separately and shall be used for bid evaluation purposes.

13.03.00 **Recommended Spares**

13.03.01 In addition to the mandatory spares, the Contractor shall also provide a list of recommended spares giving unit prices and total prices for 3 years of normal operation of the plant for spares of indigenous origin, and for 5 years of normal operation for spares of non-indigenous origin. This list shall take into consideration the mandatory spares specified elsewhere in the specification and should be a separate list.

13.03.02 The price of recommended spares will not be used for the evaluation of bids. The price of these spares shall remain valid for a period of six (6) months from the date of Award of the Contract. Where the recommended spares are the same as mandatory spares, the price shall be the same. The price for the rest recommended spares must be given separately item-wise. The prices of any recommended spares which are not common with mandatory spares shall be subject to review by the Owner, and shall be finalized after mutual discussion. While the award for mandatory spares will be finalized at the time of the award of mechanical equipment, award for recommended spares will be finalized within six (6) months thereafter.

13.04.00 **Start-up Commissioning, Operation and Maintenance Spares**

13.04.01 Start-up commissioning spares are those spares which may be required during the start-up and commissioning and initial operation and maintenance of the equipment/system of the equipment/system. All spares used until the plant is handed over to the Owner shall come under this category. Said spares, properly marked, shall be supplied together with the main equipment and shall be used by the Contractor, if needed, during erection and commissioning stages. All such spares which remain unused after the issue of the Taking-Over Certificate by owner along with an equipment-wise quantitative consumption report shall be returned to the owner during time of handover by the Contractor. The list of commissioning spares to be brought by the Contractor to ensure smooth commissioning of the plant shall be subjected to the Engineer's approval.

13.04.02 The Contractor shall submit a complete list of all such start-up spares costs of the above spares which are consumed before the handing-over of the plant shall be deemed to have been included in the lump sum proposal price of the Package, and the Contractor shall have no claim on this account to the Owner.

13.05.00 **List of Mandatory Spares**

13.05.01 For all bought out item packages, the contractor shall provide complete material/component list along with details specification, drawings, component part no. etc. during detailed engineering stage prior to final approval. Such approved document/drawings shall be made available at site (a good number) prior to commencement of erection work. Moreover, such document/drawing shall be provided in soft form (CD).

13.05.02 List of mandatory spares for package equipments is given in **Annexure-8**.

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14.00.00 PERFORMANCE GUARANTEE

- 14.01.00 The successful bidder shall be responsible for proper design, smooth and trouble-free operation of all the systems, equipment and components offered by him.
- 14.02.00 The Plant Performance Guarantee Test (and any repeats thereof) shall be conducted by the Contractor after Completion of all Facilities and handing over to ascertain whether the Facilities or the relevant part(s) can attain the Functional Guarantees specified in the Contract Documents (as mentioned in the WBPDCCL Lead specification; Volume-IIA). The contractor shall intimate the BHEL/owner of his intent to carry out the Functional Guarantee test along with the schedule in advance (at least 4 weeks) to the owner.
- 14.03.00 The Contractor's and Engineer-In-Charge's advisory personnel shall attend the Guarantee Test. WBPDCCL shall promptly provide the Contractor with such information as the Contractor may reasonably require in relation to the conduct and results of the Guarantee Test (and any repeats thereof).
- 14.04.00 The successful bidder shall guarantee that the material of construction and workmanship of all the equipment and components supplied by him are as specified under this specification and wherever there is nothing specifically mentioned shall correspond to the best available grade and quality.
- 14.05.00 The successful bidder shall also guarantee that the system, equipment and components covered by this specification shall be as per relevant standard and code and shall be suitable for continuous operation (i.e. 24 hours per day).
- 14.06.00 However, the sequence of P.G. Test shall be (1) Testing & Commissioning, (2) Trial Operation, (3) P. G. Test. After completion of the above procedure, finally take over by Plant Owner.
- 14.07.00 Bidder shall guarantee the performance requirement of Wagon Tippler machine for the guaranteed capacity of 25 Tips per hour with full capacity & number of Wagons. The performance guarantee test will be conducted as and when the required stream of conveyors and equipment, as applicable will be ready for the test. Each **stream including wagon tippler/indexer/SAC/Apron feeder shall be tested separately for continuous running of 8 hours.**
- 14.08.00 **Description Guarantee Parameter**
- (1) Wagon Tippler 25 Tips / hr guaranteed rate
- (2) Apron Feeder 1500 MTPH guaranteed capacity
- 14.09.00 Bidder shall guarantee the total power consumption path-wise at 1500 MTPH during coal conveying required at the input terminals of drive motors of the following equipment at the above mentioned guaranteed capacity performance requirements in line with conveyor package pathwise as specified by customer.
- 14.10.00 The bidder shall submit P.G. Test procedures to the Owner, for approval, prior to conduct of P.G. Test.
- 14.11.00 Bidder shall submit declaration along with bid documents in specified proforma to furnish all his guaranteed parameters, short fall in which shall attract levy of liquidated damages as applicable.

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15.00.00 LIQUIDATED DAMAGES FOR SHORT FALL IN PERFORMANCE

- 15.01.00 Should the results of the Performance Guarantee tests as stipulated in specification show that equipment have failed to meet the guaranteed capacity performance requirements, the contractor shall carry out the modification if necessary within 90 days of such tests. If the equipment fails to meet the guaranteed parameters at the end of the above specified period of 90 days owner may at his discretion reject the equipment or accept after assessing the liquidated damages listed herein under to be payable by contractor:
- 15.02.00 For each item as specified in clause **14.00.00** under 'Performance Guarantee'.
- 15.03.00 Liquidated damages to be paid @ one (1) percent of total price of connected equipment as established in the contract per one (1) percent deficiency or part thereof in guaranteed capacity/performance requirement, subject to a ceiling of 10% of connected equipment price.
- 15.04.00 For common equipment covered under different path or for testing of individual equipment, liquidated damages shall be applicable once only for each piece of equipment.

16.00.00 LIQUIDATED DAMAGES FOR POWER CONSUMPTION

- 16.01.00 If the total power consumption at the input terminals of various drive motors exceed the Guaranteed figure of power consumption, the Liquidated damages shall be payable by the contractor at the rate Rs 462,000/-per KW of excess power consumption over the Guaranteed figure.

For the purpose of above, the power consumption (total) of Wagon Tippler machine as specified shall be at the guaranteed design capacity and shall be same as obtained during the P&G test of different flow paths, specified below.

Flow Path 1	From Wagon Tippler to Boiler Bunker of Unit-5
Equipment under vendors scope for measurement of total power consumption	1. Twin Wagon Tippler 2. Indexer 3. Side arm Charger 4. Apron Feeder-2 nos 5. Dribble feeder- 2 nos

Contractor shall bring and calibrate any instruments that are required for measuring the power consumption of the machine during performance and guarantee tests.

- 16.02.00 The liquidated damages for short fall in performance and for power consumption as per the aforesaid provision shall be applicable independent of each other and shall be without any limit with regard to their total amount. Such liquidated damages may be recovered by BHEL by deduction from the contract price, by enforcing the contract performance guarantee or in any other manner.

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17.00.00 EXCLUSIONS:

Following equipment/items and systems are excluded from bidder's scope.

- 17.01.01 Design, supply and E&C of main conveyor system, Junction Towers, Dust suppression system, dust extraction system, service water system, drinking water system.
- 17.01.02 Civil erection works of Wagon Tippler complex is excluded from bidder scope. However, bidder shall do Civil & Structural design and furnish their mechanical/Civil & Structural GA Drawings of Wagon tippler complex. load data Drawings. Indicating sizes, equipment load details etc. and other input and do the grouting of equipment, minor chipping as mentioned above scope.
- 17.01.03 Bulldozer and Pay loader
- 17.01.04 Supply of coal from external source and development of Stockpile.
- 17.01.05 Supply & erection of rail outside of rail table
- 17.01.06 Ventilation system
- 17.01.07 Dust suppression system
- 17.01.08 Foot over bridge

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18.00.00 QUALITY ASSURANCE.

18.01.00 Quality Assurance Documents

- 18.01.01 Bidder shall be required to submit in eight (8) copies the following quality assurance documents within two weeks after dispatch of the equipment:
- 18.01.02 All non-destructive examination procedures, stress relief and weld repair procedure actually used during fabrication.
- 18.01.03 Welding procedures, welders, welding operators qualification certificates.
- 18.01.04 Welder identification list, listing welders and welding operators qualification procedures and welding identification symbols.
- 18.01.05 Material mill test reports on components.
- 18.01.06 The inspection plan with verification, inspection plan check points, verification sketches, if used and method used to verify that the inspection and testing points, in the inspection plan were performed satisfactorily.
- 18.01.07 Sketches & drawings used for indicating the method of tractability of the radio graphics to the location on the equipment.
- 18.01.08 Non-Destructive Examinations result reports including Radiography Interpretation Reports.
- 18.01.09 Stress Relief Time Temperature Charts.
- 18.01.10 Factory Tests results for testing required as per applicable Codes and Standards.
- 18.01.11 Inspection Records duly signed by Quality Assurance Personnel of the Employer and Contractor for agreed Inspection Hold Points. The same shall be recorded during course of inspection. Also the copy of repair/upgrading process & procedures, requiring employers approval shall be provided in documentation package.
- 18.01.12 Record of disposition of deviations duly authorized by the Employer.
- 18.01.13 Notification of Conformity certifying that the equipment is in compliance with finalized specification requirement.

18.02.00 General Requirements - Quality Assurance:

- 18.02.01 The detailed quality plans for manufacturing and field activities to be drawn up by bidder, separately as per BHEL format and should be submitted for customer approval.
- 18.02.02 Manufacturing Quality Plan will detail out all the components of equipment, various tests/inspection, to be carried out as per the requirement of the specification and standards mentioned and quality practices & procedures followed by bidder quality control organization, the Relevant Reference Documents and Standards, Acceptance Norms, Inspection Documents raised etc. during a!) Stages of Materials Procurement, manufacture, assembly and final testing/performance testing.
- 18.02.03 Field Quality Plan will detail out for all the equipment, the quality practices and procedures etc. to be followed by the contractor during various stages of site activities from receipt of materials equipment at site.
- 18.02.04 Bidder shall also furnish copies of reference documents/plant standards/acceptance norms test and inspection, procedure, etc. as referred in quality plans. These quality plans and

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reference documents/standards etc., will be subject to customer approval without which manufacture shall not proceed.

- 18.02.05 No material shall be dispatched from the manufacturers work before the same is accepted subsequent to pre dispatch final inspection including verification of records of all previous tests/inspection by the Employer's Engineer/Authorized Representative and duly authorized for dispatch, issuance of MDCC.
- 18.02.06 All materials used for equipment manufacture including castings and forgings etc. shall be tested quality as per Relevant Codes/Standards. Details of Results of the tests conducted to determine the Mechanical Properties, Chemical Analysis and Details of Heat Treatment Procedure shall be recorded on Certificates and Time Temperature Charts. Tests shall be carried out as per applicable Material Standards and/or Agreed Details.
- 18.02.07 All Welding/Brazing shall be carried out as per procedure drawn and qualified in accordance with, requirements of ASME Section IX/BS-4870 or other International Equivalent Standard acceptable to the Customer.
- 18.02.08 All Brazers/Welders and Welding Operators employed on any part of the contract either in contractors/his subcontractors works or at site or elsewhere shall be qualified as per ASME section IX or BS 4871 or other equivalent international standards acceptable to the customer.
- 18.02.09 Test results of Qualification Tests and Specimen Testing shall be furnished for approval.
- 18.02.10 All the Heat Treatment Results shall be recorded on Time Temperature Charts and verified with Recommended Regimes.
- 18.02.11 No Welding shall be carried out on Cast Iron components for repair.
- 18.02.12 Unless otherwise proven and specifically agreed, welding of dissimilar materials and high alloy materials shall be carried out at shop only.
- 18.02.13 All Non-Destructive Examination shall be performed in accordance with Written Procedures as per International Standard. NDT shall be recorded in a report which includes details of methods and equipment used, result evaluation, job data and identification of personnel employed and details of correlation of the test report with the Job.
- 18.02.14 Quality Plan submitted by bidder shall detail out, various stages of Manufacture and Installation, the Quality Practices and Procedures, the relevant reference Documents/Standards used, Acceptance Level, Inspection of Documentation raised etc.
- 18.02.15 Quality Audit/Surveillance/Approval of the results of tests and inspection will not however, prejudice the right of the customer to reject the equipment if it does not comply with the specification when erected or does not give complete satisfaction in service and the above shall in no way limit the liabilities and responsibilities of the contractor in ensuring complete conformance of the materials/equipment supplied to relevant specification, standard, data sheets, drawings, etc.
- 18.02.16 For all spares and replacement items, the quality requirement as agreed for the main equipment supply shall be applicable.
- 18.02.17 Repair/Rectification Procedures to be adopted to make the Job Acceptable shall be subject to the Customer Approval.

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18.03.00 Inspection & Testing

- 18.03.01 Bidder shall give 15 Days advance Written Notice of the equipment being ready for Testing. Such tests shall be to bidder's account except for the expenses of the inspector's. The Customer/Inspector, unless the witnessing of the tests is virtually waived, will attend such tests within 15 days of the date on which the equipment is notified as being ready for Test/Inspection failing which, the contractor may proceed with the test which shall be deemed to have been made in the Inspector's presence and he shall forth with forward to the Inspector duly certified copies of tests in Triplicate.
- 18.03.02 Type & Routine Test Report/Certificates shall include details of the Standard to which the tests are performed, Test Parameters, Acceptance Criteria, Test Set up etc. used during the Testing along with the Test Piece Details/Rating and the Detailed Test Record and the Final Test Result.
- 18.03.03 All Inspection, Measuring and Test Equipment used by the contractor shall be calibrated periodically. Bidder shall maintain all relevant records of Periodic Calibration, Instrument Identification, and shall provide for inspection by the Bidder wherever asked specifically, bidder shall calibrate Measuring/Testing Equipment in the presence of the Employer.
- 18.03.04 The details of the checks to be carried out for Various Components (MQP) are to be submitted within one month from the date of Purchase Order by the bidder for Customer Approval. However, some Indicative Checks on Different Items are given below which should necessarily form part of the Quality Assurance Plan to be agreed with the Customer.
- 18.03.05 All plates above 20 mm Thickness to be Ultrasonically Tested for Laminations.
- 18.03.06 Shaft Forgings Suspension Bars to be checked for Hardness, Microstructure and Ultrasonic Testing in addition to check for the Chemical and Mechanical Properties.
- 18.03.07 Following minimum NDT requirement to be ensured for Welds:
- (a) Butt Welds - 10% UT/RT and 100% MPI.
 - (b) Fillet welds - 10% MPI.

19.00.00 DRAWINGS AND DOCUMENTS SUBMISSION

- 19.01.00 Bidder shall furnish the contain Full Details and Drawings of the Equipment, Furnished Data Sheet, Technical Particulars, Testing Procedures and O & M manuals of the Equipment.
- 19.02.00 Bidder shall furnish the Drawings and Documents as per details given below.
- 19.03.00 The drawings sent for approval shall be in 06 sets, along with one reproducible original drawing. One print of the said drawing will be returned marked approved / approved subjected to incorporation of comments / to be resubmitted for approval after incorporation of comments / for information and records only. CAD Drg. soft copy of all Drawings. are also to be forwarded to BHEL to save time in approval process.
- 19.04.00 The supplier shall there upon furnish eight (08) prints along with reproducible original of the approved drawings / Data documents. The drawing shall be given in suitable form and software which can be integrated with the customer computer aided design system.
- 19.05.00 Schedule & number of copies required for submission should be as per the details given below:

BHEL- ISG, BANGALORE 	Coal Handling Plant for 1X660 MW WBDCL, Sagardigi TPP Technical Enquiry Specification for Wagon Tippler Package	Specification Number IS-4-EQ-724-100-M001
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Sl. No.	Description	Type of copies required	Number of copies required	Schedule of submission
1	Drawings / Documents for Approval	Prints & Soft Copies	10 Copies	Starting Two Weeks from LOI
2	Revised Drawings / Documents Incorporating Customer Comments if any.	Prints & Soft Copies	10 Copies	One Week after receipt of comments from WBDCL/DCPL forwarded by BHEL
3	Final Approved Drawings / Data / Documents	Prints & Soft Copies	12 Copies	One Week after Receipt of Approved Drawing from BHEL / Consultant.
4	Erection Drawings & Manuals	Prints	12 Copies	Eight (8) Weeks before the Despatch of the Equipment.
5	Pre-Commissioning / Commissioning Check List / Procedures.	Prints	12 copies	----- do -----
6	Quality Assurance Plan	Prints	10 Copies	One Month from The Date of placing L.O.I
7	Final Operation & Maintenance Instruction Manuals	Prints & Soft Copies	One (1) Original & 12 Copies	One Month before the Despatch of the Equipment.

19.06.00 ERECTION DRAWINGS

- 19.06.01 The Supplier shall furnish Erection Drawings for the Equipment to be erected. These shall generally comprise of Fabrication / Assembly Drawings, Various Component/Part Detail Drawings, Assembly, Clearance, Data Requirements etc. The Drawings shall contain details of Components/Equipment with Identification Numbers, Match Marks, Bill of Materials, Assembly Procedures etc. For all major Equipment apart from above details, Assembly Sequence and Instructions with Check Lists shall be furnished in the form of Erection Manuals.
- 19.06.02 Supplier shall submit all GA drawings of equipment, Design Calculations for Selection of equipment, Size of Dozer Shed, Data Sheets. Any Other Drawing requested by the Customer shall also be submitted.
- 19.06.03 Vendor should submit all the GA Drawings within One Month of the Receipt of LOI.
- 19.06.04 Every Resubmission on any Drawing should be submitted within 10 Days from the Date of Comments.
- 19.06.05 All Quality Plans shall be submitted within One Month after LOI.

ANNEXURE – X

PROJECT INFORMATION

1x660 MW Sagardighi Thermal Power Station Extn. Unit-5

1	Project Name:	1x660 MW Sagardighi Thermal Power Station Extn. Unit-5 Stage-III
2	Owner:	West Bengal Power Development Corporation Limited (WBPDCL), Bidyut Unnayan Bhaban, LA-3/C, Block-LA, Sector – III, Salt Lake City, Kolkata – 700 098
3	Consultant:	M/s. Development Consultant Pvt. Ltd. Block No. DG-4, Sector-II, Saltlake City, Kolkata - 700091
4	Project Location:	Sagardighi Thermal Power Station site is located at Manigram village, 13 KM north of Sagardighi town by the side of the SMGR (Sagardighi-Manigram-Gankar-Raghunathganj) Road at a distance 20 KM from National Highway 34 in Murshidabad District, West Bengal and around 240 KM from Kolkata, India. The nearest rail station is Manigram adjacent to the site on Bandel - Barhawara branch line and 6.5 KM from Sagardighi Railway Station on Sainthia - Azimgunj line of Eastern Railway.
5	Altitude	34M above MSL
6	Approach:	Via Road, Railway, 20 km from National Highway (NH-34)
7	Access by – nearest railway station	Manigram railway station on Bandel-Barhawara branch line 1 km from site.
8	Nearest Airport	Kolkata
9	Nearest sea port	Haldia
10	Availability of Land	Within existing plant boundary of WBPDCL.
11	Design ambient dry bulb temperature	Maximum 50°C Minimum 5°C
12	Highest wet bulb temp	Maximum 26.9°C
13	Seismic zone	Zone-III as per IS-1893 latest edition.
14	Relative Humidity	73% (avg) to 84% (max)
15	Rainfall - Annual average	1389 mm
16	Latitude and Longitude	24° 22' 13.7" N, 88° 6' 15.8" E
17	Wind Load	In accordance with IS-875 for a basic wind speed of 47 m/sec, up to a height of 10 metres above mean ground level.



ANNEXURE#1
of
Wagon Tippler Package

for

SAGARDIGHI THERMAL POWER PROJECT
1 x 660 MW UNIT NO. 5, PHASE – III
WEST BENGAL POWER DEVELOPMENT CORPORATION LIMITED

Content:

WBDCL NIT Specification (Refer separate attachments)



**ANNEXURE#2
of
Wagon Tippler Package
for**

**SAGARDIGHI THERMAL POWER PROJECT
1 x 660 MW UNIT NO. 5, PHASE – III
WEST BENGAL POWER DEVELOPMENT CORPORATION LIMITED**

Content:

- WBDCL Amendments
 - Clarifications
 - MOM
- (Refer separate attachments)



**ANNEXURE#3
of
Wagon Tippler Package
for**

SAGARDIGHI THERMAL POWER PROJECT

1 x 660 MW UNIT NO. 5, PHASE – III

WEST BENGAL POWER DEVELOPMENT CORPORATION LIMITED

Content:

ELECTRICAL SCOPE OF WORK



ISG, BANGALORE

**Coal Handling Plant for 1X660 MW
WBPDC, Sagardighi TPP
Technical Enquiry Specification for
WT Package**

Specification Number
IS-4-EQ-724-100-M001

ANNEXURE #3**ELECTRICAL AND C&I SCOPE****POWER SUPPLY SYSTEM**

1.1 H.T. Supply

a. Feeders

Voltage & Frequency	11000 V AC, 3ph, 3W, 50 Hz
Voltage variation	±6%
Frequency variation	+3% -5%
Combined Voltage & frequency variation	10% (absolute sum)
Fault level	40 KA symm for 3 sec.
Earthing	non-effectively earthed

1.2 H.T. Supply

b. Motors above 160KW

Voltage & Frequency	3300 V AC, 3ph, 3W, 50 Hz
Voltage variation	±10%
Frequency variation	+3% -5%
Combined Voltage & frequency variation	10% (absolute sum)
Fault level	40 KA symm for 3 sec.
Earthing	non-effectively earthed

1.3 L.T. Supply

a. Motors up to 160 KW

Voltage & Frequency	415V AC, 3 phase , 3W, 50 Hz
Voltage variation	±10%
Frequency variation	+5% -5%
Combined Voltage & frequency variation	10% (absolute sum)
Fault level	50 KA symm. for 1 sec.
Earthing	effectively earthed
Space heater	240V, 1 phase, 2W, 50 Hz
Earthing	effectively earthed

b. Control, Protection & Metering for LT Switchgear/MCC/Control Panel

Voltage & Frequency	110V/ 240V AC ±10%, 1 phase, 50 Hz +5% -5%
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c. Lighting, space heaters and A.C. control & protective devices (other than mentioned in point b above)

Voltage & Frequency	240V AC, 1 phase, 2W, 50 Hz
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Voltage variation	±10%
Frequency variation	+3% to -5%
Combined Voltage & frequency variation	10% (absolute sum)
Earthing	effectively earthed

d. UPS power supply for PLC, control & instrumentation

Voltage & Frequency	240V AC, 1 phase, 2W, 50 Hz stabilized supply through UPS system
Type of Incoming/Outgoing feeder switching device	MCCB
UPS DB type	Single front/Double Fully draw out type
Short circuit level for 1 sec	25 kA (minimum)

e. DC System data

Nominal Voltage to be selected for DC system	220V DC, 1 phase, 2W, 50 Hz
Voltage variation	-15% to +10%
Type of Incoming/Outgoing feeder switching device	Double pole Switch-Fuse
Short circuit level for 1 sec	25 KA (minimum)

f. Other Voltage

Voltage	24V/ 48V
	Bidder to derive the required volatges are per requirement.

g. Meteorological data of site is given below

Design ambient dry bulb temperature	50 °C maximum 5 °C minimum
Highest wet bulb temp	26.9 °C
Maximum relative humidity	84%
Average relative humidity	73%
Average annual Rainfall	1389 mm
Wind load :	In accordance with IS-875 for a basic wind speed of 47 m/sec, up to a height of 10 metres above mean ground level.
Seismic Zone	Zone III as per IS: 1893 latest edition
Altitude	34M above MSL

Note: For the purpose of design an ambient temperature of 50 deg. C



ISG, BANGALORE

**Coal Handling Plant for 1X660 MW
WBPDC, Sagardighi TPP
Technical Enquiry Specification for
WT Package**

Specification Number
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ELECTRICAL SCOPE DIVISION –

Please refer Annexure-03 for complete scope matrix and Section M3 for Electrical specification.

For Detailed specification of equipment refer WBPDC NIT documents.

The scope of this package is complete electrical and C&I EPC including erection, testing, commissioning as per scope matrix.

Terminal point – starting point of Wagon tippler Complex

For Free issue items: Bidder's scope starts from unloading, receipt, storage at site, shifting these items to erection fronts followed by erection & commissioning, trial operation, preparation of protocols and getting signed from end customer, final painting at site after erection, carrying out performance guarantee tests (under the supervision of respective OEMs) of integrated system and handing over to customer until satisfactory completion and written confirmation from customer.

Electrical BOQ for all BOI items shall be submitted within 2 weeks from LOI & electrical BOI ordering shall be completed within 4 weeks from LOI.

Further all engineering drawings/datasheets shall be furnished within 4 weeks from order placement on sub-vendor by bidder.

QAP & Inspection categorization plan has to be submitted for all electrical C&I items within 4 weeks from LOI.

Datasheets as per NIT specifications to be strictly followed for all electrical items.

SN	ADDITIONAL NOTES
1	The equipment shall be complete with all standard parts and accessories which are required for safe and trouble-free operation of the plant but not specifically mentioned in this specification. All safety feature, as required, shall be included.
2	Supply, Testing, Transportation, Erection & Commissioning of all Electrics and Control & Instrumentation related to entire mechanical scope as per specification is in bidder's scope.
3	Technical Specifications furnished in this document are minimum tentative NIT specifications to be considered by bidders however NIT specifications shall be fully binding in case of any conflicts
4	Sub-Vendors for all bidders supplied instruments/ equipment's shall be selected as per BHEL preferred vendor list. However final vendors selected shall be subject to approval of BHEL/customer/consultant.
5	Base frames, foundation bolts, both half couplings for all equipment for this package shall be in the scope of Bidder. Civil inputs as required for related electrical equipment's to be furnished by bidder.
6	Details/dimensions of panels (supplied by bidder) located in BHEL's MCC switchgear room/control rooms, if any, shall be submitted by bidder during detailed engineering.

 ISG, BANGALORE	Coal Handling Plant for 1X660 MW WBPDC, Sagardighi TPP Technical Enquiry Specification for WT Package	Specification Number IS-4-EQ-724-100-M001
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SN	ADDITIONAL NOTES
9	Total drive list with calculation and load curves shall be furnished by Bidder as part of their bid for further evaluation & final load list to be submitted within 15 days of LOI.
10	Load list/Feeder list with type and rating/power requirement shall be submitted by bidder to BHEL for providing feeders in BHEL's MCC. Wherever single phase supply is required, BHEL shall provide only 415V, 3 phase supply. Bidder shall generate single phase supply in the local control panel or power distribution board PDB with control transformers (supplied by vendor) as applicable
11	PJB/CJBs (supplied by vendor) shall be strategically located in each area to enable usage of multicore cables to DCS and optimize the cable lengths.
12	All the field instruments shall be of latest models. For the sake of completeness of the system and in order to ensure desired performance and safety measures, any hardware or software item felt required, shall be in the scope of bidder irrespective of their explicit or implicit inclusion in this specification.
13	All the instruments/equipment including transmitters, transducers temperature elements, switches which are required to implement the control philosophy as specified in corresponding mechanical sections shall also be provided by the bidder.
14	In addition to the remote control of various equipment, local push button stations & control panels shall be provided for all equipment supplied by bidder. Local starter panels as required shall also be considered by bidder.
15	For successful implementation of control system, the bidder shall furnish Control philosophy/write-up, I/O list, drive list, termination details and all other details/drawings/data/ information which shall be used for preparation of logic diagrams (by bidder) for controls, interlock and protection of Bidder's equipment. Any other data as might be required by Employer during detailed engineering stage shall also be forwarded without any cost repercussions. Bidder shall depute his engineer to BHEL/Customer office for approval of above documents.
16	Specification of various electrical equipment shall be as per the attached NIT Tender specification.
17	Obtaining all necessary statutory clearances for bidder's equipment and systems shall be under the bidder's scope.
18	With regards to Makes of all electrical equipment, bidder shall obtain prior approval from BHEL-ISG before placing order. No makes shall be acceptable without prior approval by customer.
19	Bidder should obtain prior customer approval for make, GA, OGA, schematics, data sheet, QAP for all sub vendor items.
20	Construction Power will be provided by bidder on chargeable basis. Power supply at one (1) point at 11 kV AC $\pm 10\%$, 3 Ph, 50 Hz. $\pm 5\%$ near the erection site shall be made available. For further distribution, supply of transformer & ACDB / MCC, energy meter shall be in the bidder scope. Any other voltage, if required for any operation during construction, shall be arranged by the Contractor from above source of Power supply.
21	Construction water will be provided at free of cost at single point. Further distribution shall be arranged by bidder.
22	Vendor shall submit equipment layout, cable tray layout, lighting layout, earthing layout drawings for respective machine/equipment as applicable. List of Drawings to be submitted for each equipment/system shall be intimated to the successful bidder during detailed engineering and

 ISG, BANGALORE	Coal Handling Plant for 1X660 MW WBDCL, Sagardighi TPP Technical Enquiry Specification for WT Package	Specification Number IS-4-EQ-724-100-M001
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SN	ADDITIONAL NOTES
	drawings shall be submitted in line with the list.
23	Bidder's cable schedule shall be prepared in BHEL format which will be furnished during detailed engineering stage.
24	The Bidder/Contractor shall furnish the reports of all the type tests carried out within five years of the date of bid opening as per specification and relevant standards for all components / equipment / systems. These reports should be for the tests conducted on identical/similar components / equipment / systems to those offered / proposed to be supplied under this contract. If the above reports are not found meeting the spec/relevant standards or not available, then all such test shall be conducted under this contract by the vendor free of cost to purchaser and reports shall be submitted for approval.
25	Potential free NO-NC contacts are required from all equipment for interlocking purpose to PLC.
26	Training of Customer and BHEL personnel for operation and maintenance of Bidder supplied equipment is included in the bidder's scope.
27	Testing, Erection and Commissioning of Bidder supplied equipment/systems is in Bidder's scope. Further, alignment of all motors (during erection/commissioning) shall be included in the scope of Bidder.
28	In case of any conflict & ambiguity, decision of BHEL/customer shall be final and binding.
29	3D Modeling of Cable Tray routing of Wagon Tippler Complex shall also be in bidder's scope. BHEL shall provide 2D AutoCAD drawings as inputs for 3D modeling and integration by bidder.
30	Documentation shall be as per NIT specification. Bidder to submit hard copies of all approved drawings/documents/QAP/Test reports as per NIT specification.
31	Bidder to quote Recommended and mandatory Spares as per NIT specification

ANNEXURE-03 ELECTRICAL and C&I ITEMS SCOPE OF SUPPLY AND WORKS FOR TWIN WAGON TIPPLER, SIDE ARM CHARGER WITH INDEXER, APRON FEEDER, DRIBBLE FEEDER AND EOT CRANE FOR CHP- 1X660 MW SAGARDIGHI TPP						
Sl.No.	Equipments	Design & Engineering	Supply	Receipt,Unloading/Storage and Security	Local Transport,Erection ,Testing and Commissioning	Remarks
1	11/3.3 kV HT switchboard	BHEL	BHEL	BHEL	BHEL	
2	11/0.433 KV Dry Type Transformers	BHEL	BHEL	BHEL	BHEL	Vendor shall furnish LT load list with type,rating, duty and Power requirement.
3	LT Swtichgear	BHEL	BHEL	BHEL	BHEL	
4	LT bus ducts	BHEL	BHEL	BHEL	BHEL	
5	3.3kV HT Motors	Vendor	Vendor	Vendor	Vendor	Notch, provision for mounting key phasor and mounting pads for mounting of vibration Detectors on HT Motor/Coupling/Shaft etc. shall be provided by the bidder for Vibration Monitoring and Analysis System (VMAS supplied by BHEL). The exact provision required on bidder's equipment will be provided by BHEL during detailed engineering to successful bidder and bidder shall comply with the same. Bidder shall take care of the same in the bidder submitted drawings as well.
6	Motors rating less than 160KW	Vendor	Vendor	Vendor	Vendor	Motor sizing calculations along with the interface details like GD ² values, T-S Curves, Speed, mounting arrangements etc. shall be furnished by the vendor.
7	Variable Frequency Drive Panels	Vendor	Vendor	Vendor	Vendor	VFD Panels as required for this Package is in scope of vendor. VFD panels for Apron feeder shall be kept in the WT-Control room.
8	HT Power Cables	BHEL	BHEL	BHEL	BHEL	
9	LT Power Cables	Vendor	BHEL	BHEL	Vendor	Bidder shall provide Cable sizing calculations, cable schedule and cable Termination charts upto PLC/end equipment for customer approval. BHEL will supply the cable based on BOQ of Cables furnished by vendor.
10	Control and Instrumentation Cables	Vendor	BHEL	BHEL	Vendor	Cabling and Termination between bidder supplied equipments is in the scope of bidder. Cabling and Termination between MCC and bidder supplied equipments is in the scope of BHEL.
11	Flexible/Trailing/Festoon/Composite/Co-axial Cables or any other special cable required for this package including fixing arrangement such as festooning, Cable reeling drum and bus bar etc and Termination arrangement including Junction Box etc.	Vendor	Vendor	Vendor	Vendor	

ANNEXURE-03 ELECTRICAL and C&I ITEMS SCOPE OF SUPPLY AND WORKS FOR TWIN WAGON TIPPLER, SIDE ARM CHARGER WITH INDEXER, APRON FEEDER, DRIBBLE FEEDER AND EOT CRANE FOR CHP- 1X660 MW SAGARDIGHI TPP						
Sl.No.	Equipments	Design & Engineering	Supply	Receipt,Unloading/ Storage and Security	Local Transport,Erection ,Testing and Commissioning	Remarks
12	All Data cables such as Profibus, Modbus, Ethernet cable, OFC etc. and Special cables (other than standard screen cables) i.e., cables from sensor to controllers, indicators etc. OR Encoder cables OR HART instrument cables etc., as required .	Vendor	Vendor	Vendor	Vendor	Only for bidder supplied equipments
13	Cabling accessories (Termination kits, Cable Glands , Lugs,Tags and conduits etc.)	Vendor	Vendor	Vendor	Vendor	
14	Cable trays & supports	Vendor	BHEL	BHEL	Vendor	Cable tray arrangement (E&C) of WT Complex, SAC area and Wagaon tippler area, WT Control room etc. is in the scope of bidder. Bidder shall provide BOQ of Cable tray and Supports. BHEL will supply the Cable trays and Supports based on BOQ furnished by bidder. Cable tray arrangement between WT complex starting point and MCC room is in the scope of BHEL. Preparation of Cable tray Layouts and obtaining approval from the customer for this pkg is in the scope of Bidder.
15	Structural steel for the Erection of Bidder supplied equipments	Vendor	Vendor	Vendor	Vendor	
16	Earthing& Lightning Protection	Vendor	BHEL	BHEL	Vendor	Earthing (Electrical & Electronic) and Lightning arrangement including prepartion /layout of WT Complex, WT Control room, SAC area and Wagon shifter/pusher area etc. is in the scope of bidder. Bidder shall provide BOQ of Earthing and Lightnng materials. Electrical and Electroninc Earthing connection from BHEL earth pits to WT PLC/Weigh bridge etc is in the scope of bidder. Earth Pit details shall be furnished by bidder. Any special arrangement or material required for Machine earthing/lightining shall be in the scope of bidder. Preparation of Earthing and Lightning Layouts and obtaining approval from the customerfor this pkg is in the scope of Bidder.
17	Local Push Button Stations	Vendor	Vendor	Vendor	Vendor	
18	Power and Control Junction Boxes.	Vendor	Vendor	Vendor	Vendor	Control Junction box as required for grouping for signals shall be designed by bidder.
19	ACDB / PDB / Local Control Panel(LCP) etc.	Vendor	Vendor	Vendor	Vendor	BHEL shall provide only 3phase power supply to bidder, further distribution/ step down of voltage to 240/110V/24V shall be done by bidder.

ANNEXURE-03 ELECTRICAL and C&I ITEMS SCOPE OF SUPPLY AND WORKS FOR TWIN WAGON TIPPLER, SIDE ARM CHARGER WITH INDEXER, APRON FEEDER, DRIBBLE FEEDER AND EOT CRANE FOR CHP- 1X660 MW SAGARDIGHI TPP						
Sl.No.	Equipments	Design & Engineering	Supply	Receipt,Unloading/Storage and Security	Local Transport,Erection ,Testing and Commissioning	Remarks
20	Hooters / Sirens	Vendor	Vendor	Vendor	Vendor	
21	Pull chord Switches / Belt-Sway Switches / Zero- Speed Switches/Heavy Duty Limit Switches / Torque Limit Switches/Over-Speed/Switches/ Instruments/Gauges/ Transmitters/Sensors/ Solenoid Valves/ Control Valves/ Actuators/Proximity Limit Switches and any other item required not limited to above shall be considered for Safe & reliable Operation and Monitoring of the system . Redundancy of instruments/field devices shall be provided as per C&I specifications.	Vendor	Vendor	Vendor	Vendor	Safety switch schedule/Instrument schedule to be submitted by the vendor. Brackets/Structural Steel for mounting field equipments/Instruments is in the scope of bidder.
22	PLC system (Honeywell make) for Wagon Tippler , Side Arm Charger (SAC) and Coal Handling Plant (Conveyor package, dust suppression, dust extraction, ACVS and other auxiliaries of CHP) including the below items: Network components (manageable network switch, Ethernet communication cables/OFC, network management software, Rack for mounting) HMI system - Server, OWS, EWS, laser printer, all interconnecting cables) Training - customer/End user Accessories - terminators, Couplers, Connectors, Power supply modules, LIU, Optical link modules, redundant communication link, hardware. Soft link interfaces - with other compressor panels/VMS/profiling system/ Battery/ UPS/ Fire alarm/Existing PLC. Note: The PLC model no. should be same as existing PLC system refer approved document enclosed.	Vendor	Vendor	Vendor	Vendor/CHP Package Vendor	Bidder to finish the following: PLC input/Output list including KKS tag name, Bill of material for PLC, PLC configuration diagram, Operational Philosophy of WT&SAC, Block logic diagram with recommended HMI Screens Bidder to depute official for drawing approval, software testing at PLC manufacturer's place & Customer place, and supervision for site commissioning. Coordination with CHP Package vendor for software preparation and intergration with existing PLC is in bidder's scope. Operator shall be able to control & operate the wagon tippler, Side Arm Charger (SAC) & CHP from control desk as well as from OWS. P&I drawings, Instruments list/schedule, etc including KKS tags for this package is in the scope of bidder. BHEL/CHP Package vendor shall provide the following for preparation of CHP software: Control philosophy, P&I diagrams, typical Input/Output List. Tentative count (excluding spare I/O): DI-3000 nos, DO-1100 Nos, DO(IP relay)-750 Nos, AI-500-Nos, AO-30 Nos, RTD-400 Nos. During detail engineering the I/O count may undergo addition/deletion.
23	All Data cables such as Profibus,Modbus,Ethernet cable, OFC etc. and Special cables(other than standard screen cables) i.e., cables from sensor to controllers, indicators etc. OR Encoder cables OR HART instrument cables etc., as required.	Vendor	Vendor	Vendor	Vendor	
24	UPS with Batteries for this WT, SAC & CHP Package (including supply of UPS DB as required for UPS power distribution)	Vendor	Vendor	Vendor	Vendor	2KVA load shall be considered in UPS design for BHEL use. Number of outgoing feeders(Working+Standby) for BHEL load shall be informed during DDE. Cabling between UPS to UPS DB, BHEL loads to UPS DB is in the scope of BHEL.

ANNEXURE-03 ELECTRICAL and C&I ITEMS SCOPE OF SUPPLY AND WORKS FOR TWIN WAGON TIPPLER, SIDE ARM CHARGER WITH INDEXER, APRON FEEDER, DRIBBLE FEEDER AND EOT CRANE FOR CHP- 1X660 MW SAGARDIGHI TPP						
Sl.No.	Equipments	Design & Engineering	Supply	Receipt,Unloading/Storage and Security	Local Transport,Erection ,Testing and Commissioning	Remarks
25	Micro processor based weigh bridge system with One (1) no. OWES & A3 sized DMP. Microprocessor shall be connected to Wagon Tippler RIO via redundant soft link for monitoring and Hard wired interfacing for time critical, interlock, control & protection signals.	Vendor	Vendor	Vendor	Vendor	
26	Control Desk for Wagon Tippler & SAC	Vendor	Vendor	Vendor	Vendor	
27	Air Conditioning required for WT & SAC package	Vendor	Vendor	Vendor	Vendor	
28	Illumination on Machine	Vendor	Vendor	Vendor	Vendor	Lighting of WT Complex and WT Control room by BHEL.
29	Hoists and Cranes	Vendor	Vendor	Vendor	Vendor	Complete scope of Electrical and C&I portion is in scope of vendor. BHEL will provide only 415V AC,3Ph supply up to wall/Column mounted Isolator (supply and erecting of Isolator is in the scope of bidder),further distribution including busbar, isolators, supporting structure is in vendor's scope.
30	All the Electrical and C&I Spares (Commissioning & Mandatory spares) related to bidder supplied equipments /Instruments.	Vendor	Vendor	Vendor	Vendor	All the applicable spares as per the Customer NIT specs (12A05-SPC-G-001 V-II A: Mandatory Spares) shall be supplied by vendor after approval of Spares List from end user.
31	Maintenance Tools and Tackles as applicable	Vendor	Vendor	Vendor	Vendor	
Notes:						
1	For detailed specification of the above equipments/items Customer NIT specification shall be followed.					
2	Receipt, Unloading, storage, transportation to site works, E&C of all Vendor supplied equipment/items is included in Vendor's scope. However, BHEL supplied (free issue) items are to be collected from BHEL's store and further, transportation to site works,E&C also is included in Vendor's scope.					
3	Makes of all Electrical and C&I Items/equipment shall be from the Customer/Customer Consultant's approved vendors only. For any equipment, if makes are not specified, then vendor to obtain the prior approval from Customer/Customer Consultant for that sub-vendors.					
4	The Electrical and C&I items inspection category list shall be given to successful Vendor during detailed engineering.					
5	Construction Power of 415V, 3-phase, 4 wire (on chargeable basis) shall be provided at one point from the Distribution Transformer/Distribution Board. Further distribution (including Tariff Meter installation) from the Distribution Transformer/Distribution Board shall be carried out by Vendor as per requirement.					
6	Any Statutory Clearance/License required for Vendor supplied/E&C equipments shall be in the scope of bidder.					
7	Instruments list, Cable schedule, Interconnection Cable termination Chart (ICS), Hookup drawings,etc including KKS tags for this package is in the scope of bidder.					
8	Air Conditioning requirement for this package is in the scope of bidder. Supply, Laying & Termination of Power and C&I cable upto Air conditioning Control Panel / Power distribution board shall be arranged by BHEL. Bidder to provide PDB with Two incomers with auto changeover facility. Supply, erection and commissioning of complete Air conditioning system and its associated electrics and C&I is in bidder's scope.					
9	Training of Customer and BHEL personnel for operation and maintenance of Vendor supplied equipment is included in the Vendor's scope.					
10	Civil assignment drawing for Cable Trench/Trestle/Duct/Slit, Conduits,Foundations, Pull Pits, Cut-outs/Openings and Insert Plates etc. for this package is in the scope of bidder.					
11	Final documentation as per Contract shall be in the Vendor's scope.					
12	Any other Electrical and C&I item (Hardware or Software) not covered above but required for completion of this package as per Customer NIT specs is in the scope of bidder.					

ANNEXURE-03 ELECTRICAL and C&I ITEMS SCOPE OF SUPPLY AND WORKS FOR TWIN WAGON TIPPLER, SIDE ARM CHARGER WITH INDEXER, APRON FEEDER, DRIBBLE FEEDER AND EOT CRANE FOR CHP- 1X660 MW SAGARDIGHI TPP						
Sl.No.	Equipments	Design & Engineering	Supply	Receipt,Unloading/ Storage and Security	Local Transport,Erection ,Testing and Commissioning	Remarks
13	In case of any conflict & ambiguity, decision of BHEL/customer shall be final and binding.					
14	Bidder shall sign and seal the scope matrix.					
15	O and M manuals shall be provided by bidder for supplied equipments/items .					
16	3D Modeling of Cable Tray routing of Wagon Tippler Complex shall also be in bidder's scope. BHEL shall provide 2D AutoCAD drawings as inputs for 3D modeling and integration by bidder.					

WBPDCL - 1X660 MW Sagardighi TPP, Extension, Unit-5							
SI No	Type of Doc D-Drawing Q-Quality Plan V-Vendor List	Drg No	Title	Area/System	Purpose	Scheduled Date	sub vendor name
1	D	IS-1-EE-724-103-E001	ELECTRICAL EQUIPMENT LAYOUT FOR WT & SAC CONTROL ROOM	Electrical-CHP	A		
2	D	IS-1-CL-724-103-E002	CABLE TRAY AND EARTHING LAYOUT OF WT COMPLEX	Electrical-CHP	I		
3	D	IS-1-CL-724-103-E003	CABLE TRAY AND EARTHING LAYOUT FOR WT & SAC CONTROL ROOM	Electrical-CHP	I		
4	D	IS-4-GA-724-103-E001	GA, DATASHEET, TB DWGS, CHAR. CURVES OF LT MOTOR FOR WT & SAC MACHINE	Electrical-CHP	A		
5	D	IS-4-GA-724-103-E002	GA, DATASHEET AND CATALOGUES OF FIELD DEVICES FOR WT & SAC MACHINE	Electrical-CHP	A		
6	D	IS-4-GA-724-103-E003	GA, BOM, SCHEMES OF PLC FOR WT & SAC MACHINE	Electrical-CHP	A		
7	D	IS-4-GA-724-103-E004	GA, DATASHEET OF UPS FOR WT & SAC MACHINE PLC	Electrical-CHP	A		
8	D	IS-4-GA-724-103-E005	GA, SCHEMES OF CONTROL DESK FOR WT & SAC MACHINE	Electrical-CHP	A		
9	D	IS-4-GA-724-103-E006	GA, DATASHEET, WIRING DIAGRAM OF LPBS FOR MACHINE PACKAGE	Electrical-CHP	A		
10	D	IS-4-GA-724-103-E007	GA DRAWINGS, SCHEMES OF VFD PANEL FOR APRON FEEDER	Electrical-CHP	A		
11	D	IS-4-GA-724-103-E008	GA ,BOM OF POWER & CONTROL JUNCTION BOXES FOR WT & SAC MACHINE PKG	Electrical-CHP	A		
12	D	IS-4-GA-724-103-E009	GA ,BOM OF CONTROL JUNCTION BOXES FOR WT & SAC MACHINE PKG	Electrical-CHP	A		
13	D	IS-4-MS-724-103-E001	WT & SAC MACHINE ELCTRICAL LOAD LIST	Electrical-CHP	A		
14	D	IS-4-MS-708-103-E001	PLC CONFIGURATION WT & SAC MACHINE	Electrical-CHP	A		
15	D	IS-4-IO-724-103-E001	PLC I/O LIST WT & SAC MACHINE	Electrical-CHP	A		
16	D	IS-4-LD-724-103-E001	PLC LOGIC AND HMI SCREEN DIAGRAMS FOR WT & SAC MACHINE	Electrical-CHP	A		
17	D	IS-4-CS-724-103-E001	POWER CABLE SCHEDULE WT & SAC MACHINE	Electrical-CHP	A		
18	D	IS-4-CS-724-103-E002	CONTROL & INSTRUMENTATION CABLE SCHEDULE FOR WT & SAC MACHINE	Electrical-CHP	A		
19	Q	IS-4-QP-724-103-E001	QAP OF PLC FOR WT & SAC MACHINE	Electrical-CHP	A		
20	Q	IS-4-QP-724-103-E002	QAP OF UPS FOR WT & SAC MACHINE PLC	Electrical-CHP	A		
21	Q	IS-4-QP-724-103-E003	QAP OF CONTROL DESK FOR WT & SAC MACHINE	Electrical-CHP	A		
22	Q	IS-4-QP-724-103-E004	QAP OF LPBS FOR WT & SAC MACHINE	Electrical-CHP	A		
23	Q	IS-4-QP-724-103-E005	QAP OF LT MOTORS FOR WT & SAC MACHINE	Electrical-CHP	A		
24	Q	IS-4-QP-724-103-E006	QAP OF FIELD DEVICES FOR WT & SAC MACHINE	Electrical-CHP	A		

Note: The drawing list is tentative. However, bidder to submit all engineering documents required for the project.



**DEVELOPMENT CONSULTANTS
PVT. LIMITED.**

Reviewed only for general conformance with contract drawings and specifications. Contractor to be responsible for any errors and for fulfillment of detailed requirements of contract documents

ACTION **2** DATE **04-10-2016**

DISTRIBUTED BY. **A.Thakur**

1	Distributed	4	Approved except as noted. Resubmission required
☒	Approved	5	Disapproved see accompanying letter

3	Approved except as noted. Forward final drawings	6	For information only
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SEE COVERING LETTER

LETTER REF NO. **WBPDCL** DATE. **04-10-2016**

Owner

Owner's Consultant

DCPL

Project

**SAGARDIGHI TPP
2 x 500 MW UNITS # 3 & 4**

Package

ASH HANDLING SYSTEM

INDURE Drawing / Document No.

I-5034-CI-VD-008

WBPDCL Drawing / Document No.

SG2-2-AHP02-VD00-04-0022

Title :

DATA SHEET OF PLC AND SPECIFICATION.



**THE INDURE PVT. LIMITED
NEW DELHI-INDIA**

Approved By		ARUN	ARUN	ARUN	ARUN	ARUN	
Reviewed By	Mech	AG	AG	AG	SC	SC	
	Elect	AV	AV	AV	AV	AV	
	C&I	ARUN	ARUN	ARUN	ARUN	ARUN	
Prepared	By	SOURAV	SOURAV	SOURAV	SOURAV	SOURAV	
Date		24.02.16	21.04.16	06.07.16	22.08.16	26.09.16	
Revision		0	1	2	3	4	5

		PROJECT :- SAGARDIGHI TPP 2 x 500 MW UNITS # 3 & 4, ASH HANDLING SYSTEM
		CUSTOMER :- THE INDURE PVT. LIMITED NEW DELHI-INDIA
		OWNER :- WBPDCCL
		OWNER CONSULTANT :- DEVELOPMENT CONSULTANTS PVT LTD
Sr.no	Customer comments	INDURE Reply
1	Noted but the time synchronisation scheme is not yet formally submitted for approval.	M/s Indure has been submitted time synchronisation scheme on 21-09-2016 NOTED.
2	Noted but please revise the BBU including the items mentioned in the Misc. items. Same has been conveyed to M/s Indure many times (OTDR)	M/s Indure has been discussed with WBPDCCL regarding OTDR. The BBU has finalised during the meeting. Accordingly M/s Indure has revised & submitted the BBU to WBPDCCL for approval. NOTED.
3	Noted but Please provide the Test certificates for the tests mentioned in the tender spec V.IID:73 clause 13.03.07 at the time of inspection for verification by M/s Indure & M/s WBPDCCL[TPIA]	Noted and confirmed, M/s Honeywell request to provide manufacturing clearance for FO cable. NOTED.
4	Noted but please revise the BBU including the items mentioned in the Misc. items. Same has been conveyed to M/s Indure many times (FO CONDUIT)	M/s Indure has been discussed with WBPDCCL regarding FO Conduit. The FO conduit will be despatched separately by M/s Indure under misc. items. The BBU will not be revised regarding this item. NOTED.
5	Noted but catalogue for FO cable and UTP not attached.	STP cable supplied hence catalogue of both updated in datasheet NOTED.
6	Please place the heading at the start of each page. Please rectify	Updated NOTED.
7	As commented in EMS configuration; As per tender spec V.IIC/S-I:22 Clause 7.03.00; the HMI stations shall be client server based. i.e., all the data pertaining to Energy meters shall be collected in Communication server. Hence please confirm & include the datasheet for communication server.	EMS server is not in the scope of M/s Honeywell package. The server will be despatched separately by M/s Indure. M/s Indure has included the same in the revise BBU. NOTED.
8	Please provide the Test certificates for the tests mentioned in the tender spec V.IID:73 clause 13.03.07 at the time of inspection for verification by M/s Indure & M/s WBPDCCL[TPIA]	Refer to serial no.3 NOTED.

Honeywell	CUSTOMER: THE INDURE PRIVATE LIMITED	
	CONSULTANT: DCPL, KOLKATA	
	END USER : WBPDC	
	PROJECT : SAGARDIGHI THERMAL POWER EXTENSION (AHP)	Page 1 of 14

CUSTOMER NAME : THE INDURE PRIVATE LIMITED

PROJECT NAME : SAGARDIGHI THERMAL POWER EXTENSION

DOCUMENT : DATA SHEETS OF PLC

☐ PRELIMINARY
 ☒ FOR APPROVAL
 ☐ AS-SHIP
 ☐ AS-BUILT

DISTRIBUTION

INDURE

2	12/08/2016	As Per comments	Approved By	Anupam Das	Project Manager	
1	20/04/2016	As Per comments	Verified By	Bhavin Patel	Lead Engineer	
0	19/02/2016	Original Issue	Prepared By	Sanjeeth Thekkada	Project Engineer	
R	DATE	DESCRIPTION		NAME	DESIGNATION	SIGN

Honeywell	CUSTOMER: THE INDURE PRIVATE LIMITED				
	CONSULTANT: DCPL, KOLKATA				
	END USER : WBPDC				
	PROJECT : SAGARDIGHI THERMAL POWER EXTENSION (AHP)				Page 2 of 14

E						
V						

CONTENT LIST & REVISION STATUS SHEET

DESCRIPTION			REVISION					DATE OF FINAL REVISION
DOCUMENT NO	PAGE NO	TITLE	0	1	2	3	4	
	1	Cover Sheet			X			12/08/2016
	2	Index			X			12/08/2016
	3	Datasheet of ML-200R CPU Module			X			12/08/2016
	5	Datasheet of ML-200 Fast Ethernet I/F module			X			12/08/2016
	6	Datasheet of IO Interface with CPU			X			12/08/2016
	7	Datasheet of Power Supply Module			X			12/08/2016
	8	Datasheet of Digital Input Module			X			12/08/2016
	9	Datasheet of Digital Output Module			X			12/08/2016
	10	Datasheet of Analog input module			X			12/08/2016
	11	Datasheet of Analog Output module			X			12/08/2016
	12	Datasheet of RTD module			X			12/08/2016
	13	Datasheet of Communication module			X			12/08/2016
	14	FO Sync Cable			X			12/08/2016

Honeywell	CUSTOMER: THE INDURE PRIVATE LIMITED	
	CONSULTANT: DCPL, KOLKATA	
	END USER : WBPDC	
	PROJECT : SAGARDIGHI THERMAL POWER EXTENSION (AHP)	Page 3 of 14

General	Make	HONEYWELL
	Model No	2MLR-CPUH/T
	Quantity	As per BOM
	Description	Master Logic 200R CPU Module
Performance Specification	Communication Interface with IO Rack	Redundant Bi-Directional bus communication
	I/O Control Method	Scan Synchronous batch Processing System (Refresh Type)
	Programming language	LD(Ladder Diagram), ST(Structured Text), SFC(Sequential Function Start), IL(Instruction List, View function only)
	Number of Instructions	Operator : 18 Basic functions: 130 + real number operation function Basic function block : 41 Dedicated function block : Special function blocks, process function blocks
	Memory capacity	23 MB including flash
	Maximum I/O Points	23,808 points (31bases *12slots*64points)
	Flash Memory	16 MB
	Timer	No limit in points Time range : 0.001~4,294,967.295 s (1,193 hours)
	Counter	No limit in points Counter range : 64 bit range (-32767 to 32767)
	CPU Operation Mode	RUN , STOP, DEBUG
	CPU Media	Electrical
	CPU Restart Modes	Cold, Warm
	Self Diagnostics Functions	Watchdog timer , Memory error detection, I/O error detection , battery error detection , power supply error detection ,etc
	Data protection method at power failure	Set to retain area in basic parameter
	Battery life	The durability of the battery normally depends on power time-out, ambient temperature, and so on.

Honeywell	CUSTOMER: THE INDURE PRIVATE LIMITED	
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	PROJECT : SAGARDIGHI THERMAL POWER EXTENSION (AHP)	Page 4 of 14

		However, the MasterLogic-200R batteries are designed to use for more than 7 years in any environment.
	Max. length between extension base	Electric (100m)
	Operation monitoring between CPU	Redundant monitoring by Sync.
	Data backup between CPU	1Gbps fiber optic and maximum length 200m (recommended)
	Data sync. Method between CPU	Set in redundancy parameter
	Master switching time	<22 ms and Bumpless
	Operating Temperature	0-60 Deg C

Honeywell	CUSTOMER: THE INDURE PRIVATE LIMITED	
	CONSULTANT: DCPL, KOLKATA	
	END USER : WBPDC	
	PROJECT : SAGARDIGHI THERMAL POWER EXTENSION (AHP)	Page 5 of 14

General	Make		HONEYWELL
	Model No		2MLL-EFMT
	Quantity		As per BOM
	Description		Masterlogic-200 Fast Ethernet I/F module
Performance Specification	Ethernet Standard		IEEE802.3 (ETHERNET STANDARD SUPPORTED)
	Protocol		TCP-IP, UDP-IP
	Software firewall		IP address setting in Softmaster-NM
	Public network access		DNS server and gateway IP address setting
	Dynamic IP address for ADSL		DHCP protocol
	Highway topology (transmission method)		Baseband
	Baud rate		10/100 Mbps
	Physical layer		100baseTx (T.P)
	Media		UTP/STP , CAT5 (RJ45 Connector)
	Transmission distance		100m (switch/node, UTP/STP)
	Max. no. of nodes		Hub connection –(Up to 9 recommended)
	Service /Protocol	HSL	Peer-to-peer high speed link with other Master logic PLCs
		MLDP	Experion interface – Master logic dedicated protocol
		Modbus TCP slave	MODBUS TCP slave protocol
		P2P	MODBUS TCP Master, user defined protocol master
		Softmaster I/F	Present
	Configuration software		Softmaster –NM
	LED's		RUN,I/F,HS,P2P,PADT,PC,ERR,TX,RX,10/100
	Network diagnostics		Auto-scan, ping test, frame monitor, link monitor
	Current consumption (mA)		410
	Operating Temperature		0-60 Deg C

Honeywell	CUSTOMER: THE INDURE PRIVATE LIMITED	
	CONSULTANT: DCPL, KOLKATA	
	END USER : WBPDCCL	
	PROJECT : SAGARDIGHI THERMAL POWER EXTENSION (AHP)	Page 6 of 14

General	Make	HONEYWELL
	Model No	2MLR-DBDT
	Quantity	As per BOM
	Description	IO Interface with CPU
Performance Specification	Media	Electrical
	Maximum distance between extension bases	Electrical (100m)
	Loader connection	Extension drive USB
	Range of station no.	1~31
	Communication Speed	100 Mbps (two complete Isolated port in one housing)
	Operating Temperature	0-60 Deg C

Honeywell	CUSTOMER: THE INDURE PRIVATE LIMITED	
	CONSULTANT: DCPL, KOLKATA	
	END USER : WBDCL	
	PROJECT : SAGARDIGHI THERMAL POWER EXTENSION (AHP)	Page 7 of 14

GENERAL	Make		Honeywell
	Model		2MLR-AC23
	Description		Power Supply Module for IO rack and CPU Rack
	Quantity		As per BOM
PERFORMANCE SPECIFICATION	Input	Rated input voltage	220 VAC
		Input voltage range	176 – 264 VAC
		Input frequency	47-63 Hz
		Efficiency	65% or more
		Input fuse	Built-in (Not replaceable) : AC250V/3.15A, UL standard (Time-lag Type)
		Allowable momentary shutdown	Within 20ms
	Output	Output voltage	DC 5V (±2%)
		Output current	8.5 A
		Over current protection	9.3A ~ 17.0A
		Output power	46.75 W @ 55 °C
	Relay output	Application	RUN contact
		Rated switching	DC 24V , 0.5A
		Voltage/current	
		Minimum switching load	DC 5V ,1mA
		Response time	OFF→ON/ON→OFF :10 ms or less / 12 ms or less
		Life	Mechanical : more than 20,000,000 contacts
			Electrical :more than 100,000 contacts at rated switching voltage/current
	RUN signal output		Relay output , rating :DC24V , 0.5A
	Voltage status display		LED ON when output voltage is normal
	Applied base and install position		Power part of basic/extension base
	Operating Temperature		0-60 Deg C

Honeywell	CUSTOMER: THE INDURE PRIVATE LIMITED	
	CONSULTANT: DCPL, KOLKATA	
	END USER : WBDCL	
	PROJECT : SAGARDIGHI THERMAL POWER EXTENSION (AHP)	Page 8 of 14

GENERAL	Make		Honeywell
	Model		2MLI-D22A
	Description		Digital Input Module
	Quantity		As per BOM
PERFORMANCE SPECIFICATION	Input point		16point
	Isolation method		Photo coupler insulation
	Rated input voltage		DC24V
	Rated input current		About 4 mA
	Operation voltage range		DC20.4~28.8V (Ripple rate <5%)
	ON voltage/current		DC19V or higher / 3 mA or higher
	OFF voltage/current		DC11V or lower /1.7 mA or lower
	Fuse protection		Fuse Protection and Short Circuit protection, Field cable monitoring is available at RTP.
	Field Cable Monitoring		
	Short Circuit Protection		
	Response time	OFF→ON	1ms/3ms/5ms/10ms/20ms/70ms/100ms(set by CPU parameter) Default : 3ms
		ON→OFF	1ms/3ms/5ms/10ms/20ms/70ms/100ms(set by CPU parameter) Default : 3ms
	Insulation pressure		AC560V rms/3 Cycle (attitude 2000m)
	Insulation resistance		10MΩ or more by merger
	Common method		16 point/ COM
	Current consumption (mA)		30mA
	Operation Indicator		Each Channel LED indication available
	External connection method		18-point terminal block connector (M3×6screw)
Operating Temperature		0-60 Deg C	

Honeywell	CUSTOMER: THE INDURE PRIVATE LIMITED	
	CONSULTANT: DCPL, KOLKATA	
	END USER : WBDCL	
	PROJECT : SAGARDIGHI THERMAL POWER EXTENSION (AHP)	Page 9 of 14

GERENAL	Make		Honeywell
	Model		2MLQ-TR2B
	Description		Digital Output module
	Quantity		As per BOM
PERFORMANCE SPECIFICATION	Output point		16 point
	Insulation method		Photo coupler insulation
	Rated load voltage		DC 12V / 24V
	Load voltage range		DC 10.2 ~ 26.4 V
	Max. load current		0.5A / 1 point, 4A / 1COM
	Off leakage current		0.1mA or less
	Max. inrush current		4A / 10ms or less
	Max. voltage drop (on)		DC 0.3V or less
	Surge absorber		Zener diode
	Fuse Protection		Features Available in DO TB.
	Response time	OFF→ON	1 ms or less
		ON→OFF	1 ms or less (rated load , resistive load)
	Common method		16 point/ COM
	Current consumption		70 mA (when all point ON)
	External power supply	Voltage	DC12/24 ± 10% (ripple voltage 4 Vp-p or less)
		Current	10 mA or less (DC24V connection)
	Operation indicator		Each Channel LED indication available
	External connection method		18-point terminal block connector (M3×6screw)
	Operating Temperature		0-60 Deg C

Honeywell	CUSTOMER: THE INDURE PRIVATE LIMITED	
	CONSULTANT: DCPL, KOLKATA	
	END USER : WBPDC	
	PROJECT : SAGARDIGHI THERMAL POWER EXTENSION (AHP)	Page 10 of 14

GENERAL	Make	Honeywell	
	Model	2MLF-AD16A	
	Description	Analog input module	
	Quantity	As per BOM	
PERFORMANCE SPECIFICATION	Analog input	Voltage Input : DC 1 ~ 5 V ; DC 0 ~ 5 V ; DC 0 ~ 10 V,DC-10~10 (Input Resistance: 1MΩ minimum) Current Input : DC 4~20 mA ; DC 0~20 mA (Input Resistance 250 Ω)	
	Analog input range setting	Analog input range can be individually selected for each channel either through user program or via user friendly GUI [I/O Parameter] function in softmaster	
	Max. resolution (Current)	Analog input range (Current)	Resolution(1/16000)
		4~20 mA	1.0μA
		0~20 mA	1.25μA
	Max. resolution (Voltage)	Analog input range (voltage)	Resolution(1/1600)
		1-5 V	250mV
		0-5V	3125mV
		0-10V	625mV
		-10~10V	250mV
	Accuracy	±0.2% or less (when ambient temperature is 25 (±5) °C)	
	Max. conversion speed	500μs/channel	
	Absolute max. input	±15V / ±30mA	
	Analog input channel	16 channel / 1 module	
	Current consumption	DC 5 V : 330 mA	
	RUN LED	Display the operation status of 2MLF-AD16A ON : operation normal BLINK: error occur OFF:DC5V disconnected , module error	
	Transmitter power supply	24 VDC	
	Input filtering for noise level	Available	
	Transmitter monitoring , wire break and limit values	Available	
	Monitoring of A to D conversion	Available	
	Detection of open circuit	Available	
	Alarm limit testing for high, high-high , low, and low-low substituted values	Available	
	Operating Temperature	0-60 Deg C	

PURCHASE SPECIFICATIONS FOR PLC SYSTEM	DOC NO : P15U007-101-14A	REV -2
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Honeywell	CUSTOMER: THE INDURE PRIVATE LIMITED	
	CONSULTANT: DCPL, KOLKATA	
	END USER : WBDCL	
	PROJECT : SAGARDIGHI THERMAL POWER EXTENSION (AHP)	Page 11 of 14

GENERAL	Make	Honeywell	
	Model	2MLF-DC8A (current Output Type)	
	Description	Analog Output module	
	Quantity	As per BOM	
PERFORMANCE SPECIFICATION	Analog Output	Current Output : DC 4~20 mA ; DC 0~20 mA (Load Resistance 550 Ω or less)	
	Analog Output range setting	Analog output range can be individually selected for each channel either through user program or via user friendly GUI [I/O Parameter] function in softmaster	
	Digital value	Signed 16-bit binary value (data :14 bits)	
	Max. resolution (Current)	Analog Output range (Current)	Resolution(1/16000)
		4~20 mA	1.0 μ A
		0~20 mA	1.25 μ A
	Accuracy	$\pm 0.2\%$ or less (when ambient temperature is 25 (± 5) $^{\circ}$ C)	
	Max. conversion speed	250 μ s/channel	
	Absolute max. Output	± 24 mA	
	Analog Output channel	8 channel / 1 module	
	Isolation method	Isolated Chanel	
	Current consumption	DC 5 V : 190 mA	
	RUN LED	Display the operation status of 2MLF-DC8A ON : operation normal BLINK: error occur OFF:DC5V disconnected , module error	
	Features	Direct or reverse operation	
	Operating Temperature	0-60 Deg C	

Honeywell	CUSTOMER: THE INDURE PRIVATE LIMITED	
	CONSULTANT: DCPL, KOLKATA	
	END USER : WBPDC	
	PROJECT : SAGARDIGHI THERMAL POWER EXTENSION (AHP)	Page 12 of 14

GENERAL	Make	Honeywell	
	Model	2MLF_RD8A	
	Description	RTD module	
	Quantity	As per BOM	
PERFORMANCE SPECIFICATION	Input sensor type	Pt100	JIS C1604-1997
		JPt100	JIS C1604-1981, KS C1603-1991
	Temperature input range	Pt100	-200.0 – 850.0
		JPt100	-200.0 – 640.0
	Temperature display (unit: 0.1)		-2000 – 8500 (PT100)
			-2000 – 6400 (JPT100)
		Scaling display (Customize)	0 – 65535
	Digital output		(-)32768 – 32768
	Precision	±0.2% or less (when ambient temperature is 25 °C)	
	Wire Method	3 Wire (Resistance between two wire of field shall be less tah 1 Ohms)	
	Current consumption	DC 5 V : 450 mA	
	1. RUN LED 2. ALM LED	1. Displays the hardware operation status (Fatal fault) On: module H/W Normal Flickering: module H/W Error (0.2s flickering) Off: H/W abnormal. 2. Displays the status of the channels(Soft fault) On: Normal status Flickering: Disconnection is detected (1sec flickering) Off: Operation stop of all channels	

Honeywell	CUSTOMER: THE INDURE PRIVATE LIMITED	
	CONSULTANT: DCPL, KOLKATA	
	END USER : WBDCL	
	PROJECT : SAGARDIGHI THERMAL POWER EXTENSION (AHP)	Page 13 of 14

Make	Honeywell
Model	2MLL-C42A
Description	Communication module
Quantity	As Per BOM
Serial communication channel	2 channels , Conforms to RS-422/485 standards
Operating mode (specified per port)	Client communication protocols supported are: • Proprietary MLDP Server – Limited client • Modbus ASCII / RTU client (Modbus master) • User-defined communication client
P2P	
SERVER	• Proprietary MLDP Server – Limited client • Modbus ASCII / RTU server (Modbus slave)
Data type	Data Bits 7 or 8 Stop Bits 1 or 2 Parity Even/Odd/None
Synchronization type	Asynchronous type
Transmission speed (bps)	300 / 600 / 1200 / 2400 / 4800 / 7200 / 9600 / 19200 / 38400 / 57600 / 64000 / 115200bps supported

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	END USER : WBPDC	
	PROJECT : SAGARDIGHI THERMAL POWER EXTENSION (AHP)	Page 14 of 14

FO SYNC CABLE:

GENERAL	SERVICE	SYNCHRONIZATION CABLE
	QUANTITY	3 
	MODEL	2MLC-F201
PERFORMANCE SPECIFICATION	Mode	Multi-Mode
	Fiber Type	62.5 / 125 Microns glass fiber
	length	2m
	Max Length	2Km
	Weight	21g
	Connector Type	Lucent Connector (LC Type)
	Return Loss	Over 45db

Honeywell	CUSTOMER: THE INDURE PRIVATE LIMITED	
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	END USER : WBDCL	
	PROJECT : SAGARDIGHI THERMAL POWER EXTENSION (AHP)	Page 1 of 26

CUSTOMER NAME : THE INDURE PRIVATE LIMITED

PROJECT NAME : SAGARDHIGI THERMAL POWER EXTENSION

DOCUMENT : DATASHEET BOUGHTOUT

☐
PRELIMINARY

☒
FOR APPROVAL

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AS-SHIP

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AS-BUILT

DISTRIBUTION

INDURE

4	21/09/2016	As per comments				
3	12/08/2016	As per comments				
2	14/06/2016	As per comments	Approved By	Anupam Das	Project Manager	
1	20/04/2016	As per comments	Verified by	Bhavin Patel	Lead Engineer	
0	19/02/2016	Original Issue	Prepared By	Sanjeeth Thekkada	Project Engineer	
REV	DATE	DESCRIPTION		NAME	DESIGNATION	SIGN

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	PROJECT : SAGARDIGHI THERMAL POWER EXTENSION (AHP)	Page 3 of 26

WORK STATION (ES + OS)

General	MAKE	DELL
	MODEL	Optiplex 3020 MT
Performance Specifications	PROCESSOR	Intel i5 Quad Core, Intel HD graphics 4600,6MB Cache
	PROCESS SPEED	3.06GHz
	RAM	6GB DDR3 SDRAM Memory, 1333MHz,ECC
	HARD DISC Type	7200 RPM 3.5" SATA Hard Drive
	HARD DISC CAPACITY	500 GB
	NETWORK CONTROLLER	2 Broadcom Gigabit port
	CD DRIVE	CD-RW/DVD Combo, DVD-ROM, DVD+/-RW
	KEYBOARD	Qwerty KEY BOARD
	USB port	2 Nos. 3.0 USB & 6 Nos. 2.0 USB ports
	MOUSE	OPTICAL SCROLL MOUSE
	OPERATING SYSTEM	Windows 7 Professional 64 bit
	OTHER SOFTWARE	MS OFFICE 2013, McAfee Antivirus Software
	POWER SUPPLY	90-240VAC, 50 HZ
	Quantity	As per BOM
Others	PS/2 & serial port	Not Available
	Video Card	Not Applicable
	Chassis	Tower type.
	Video Memory	783MB
	GPU/VPU	Integrated Intel HD graphics 4600

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Monitor

Make: Dell

Model number: E2314

General	Make	Dell
	Model No.	E2314
Specification	VIS (Viewable Image Size)	23 inches
	Horizontal	509.8 mm (20.07 inches)
	Vertical	286.7 mm (11.29 inches)
	Maximum resolution	Full HD 1920 x 1080 at 60 Hz
	Pixel pitch	0.265 mm
	Brightness (typical)	250 cd/m ²
	Color gamut (typical)	83%3
	Color depth	16.7 million colors
	Contrast ratio (typical)	1000:1
	Viewing angle (typical) (vertical/horizontal)	160°/ 170°
	Response time (typical)	5 ms (black to white)
	Panel technology	TN (active matrix –TFT LCD)
	Backlight	LED
	Connectors	VGA, DVI-D (HDCP)
	Dell soundbar4 (optional)	AC511
	AC input voltage/frequency/current	100 to 240 VAC/50 or 60 Hz ± 3 Hz/1.5 A (typical)
	Power consumption	22W (typical)
	Power consumption standby/sleep mode	<0.5 W
	Quantity	As per BOM

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Bulk Power Supply 40A:

GENERAL	Make		Phoenix Contact
	Model		QUINT-PS/1AC/24DC/40
	Description		Bulk Power Supply
	Quantity		As per BOM
PERFORMANCE SPECIFICATION	Input	Rated input voltage	100 VAC-240 VAC
		Input voltage range	85 VAC- 264 VAC, 90 VDC- 300 VDC
		Input frequency	45-65 Hz
		Current consumption	Approx. 4.6 A (230 V AC)
		Input fuse	20A (slow-blow, internal)
	Output	Output voltage	24 V DC $\pm 1\%$
		Output current	40 A (-25°C ... 70°C) 45 A (with POWER BOOST, < 40°C permanent)
		Setting range of the output voltage	18 V DC ... 29.5 V DC (> 24 V constant capacity)
	Status display		"DC OK" LED green, "BOOST" LED yellow
	Maximum inrush current		≤ 45 A
OPERATING	Operating temperature		-25 °C ... 70 °C (> 60 °C derating)
	Operating humidity		95 % (at 25 °C, no condensation)
	Safety of transformers		As per IEC 61558-2-17 Standards
	Efficiency		> 92 % (for 230 V AC and nominal values)
	Over Voltage		265VAC
	Over temperature		70 °C
	Short Circuit		Protective Circuit Varistor, gas-filled surge arrester

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Bulk Power Supply 20A:

GENERAL	Make		Phoenix Contact
	Model		QUINT-PS/1AC/24DC/20
	Description		Bulk Power Supply
	Quantity		As per BOM
PERFORMANCE SPECIFICATION	Input	Rated input voltage	100 VAC-240 VAC
		Input voltage range	85 VAC- 264 VAC, 90 VDC- 350 VDC
		Input frequency	45-65 Hz
		Current consumption	Approx. 2.3 A (230 V AC)
		Input fuse	12A (slow-blow, internal)
	Output	Output voltage	24 V DC $\pm 1\%$
		Output current	20 A (-25°C ... 70°C)
		Setting range of the output voltage	18 V DC ... 29.5 V DC (> 24 V constant capacity)
	Status display		"DC OK" LED green, "BOOST" LED yellow
	Inrush current limitation		≤ 25 A typical
OPERATING	Operating temperature		-25 °C ... 70 °C (> 60 °C derating)
	Operating humidity		95 % (at 25 °C, no condensation)
	Safety of transformers		As per IEC 61558-2-17 Standards
	Efficiency		> 93 % (for 230 V AC and nominal values)
	Over Voltage		265VAC
	Over temperature		70 °C
	Short Circuit		Protective Circuit Varistor

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Honeywell	CUSTOMER: THE INDURE PRIVATE LIMITED	
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Bulk Power Supply 10A:

GENERAL	Make		Phoenix Contact
	Model		QUINT-PS/1AC/24DC/10
	Description		Bulk Power Supply
	Quantity		As per BOM
PERFORMANCE SPECIFICATION	Input	Rated input voltage	100 VAC-240 VAC
		Input voltage range	85 VAC- 264 VAC, 90 VDC- 350 VDC
		Input frequency	45-65 Hz
		Current consumption	Approx. 1.2 A (230 V AC)
		Input fuse	10A (slow-blow, internal)
	Output	Output voltage	24 V DC $\pm 1\%$
		Output current	10 A (-25°C ... 70°C) 15 A (with POWER BOOST, < 40°C permanent)
		Setting range of the output voltage	18 V DC ... 29.5 V DC (> 24 V constant capacity)
	Status display		"DC OK" LED green, "BOOST" LED yellow
	Inrush current limitation		≤ 15 A typical
OPERATING	Operating temperature		-25 °C ... 70 °C (> 60 °C derating)
	Operating humidity		95 % (at 25 °C, no condensation)
	Safety of transformers		As per IEC 61558-2-17 Standards
	Efficiency		> 92.5 % (for 230 V AC and nominal values)
	Over Voltage		265VAC
	Over temperature		70 °C
	Short Circuit		Protective Circuit Varistor

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48 PORT MANAGED ETHERNET SWITCH

Make	D-link
Model	DES-3552 Managed 48-Port 10/100 L2+ Switch
LINE VOLTAGE	100-240 VAC
FREQUENCY	50-60 Hz
MAX. POWER RATING	34 Watt
10/100 BASE ETHERNET	48 10/100BASE-TX Auto-Negotiating, Auto-MDI/MDIX Ports
UPLINK CONNECTOR	2 Dual-Usage 10/100/1000BASE-T Stacking Ports
SOFTWARE IMAGE	Microsoft® NAP: 802.1X NAP / DHCP NAP
SWITCHING FABRIC	32.0 Gbps
MAX. CONFIGURABLE TRANSMISSION UNIT	9000 Bytes
OPERATING TEMPERATURE	0 to 50 °C
OPERATING HUMIDITY	5% to 95% non-condensing
STORAGE TEMPERATURE	-40 to 70 °C
HEIGHT	44 mm
WIDTH	441 mm
DEPTH	210 mm
WEIGHT	4.09 Kgs
Quantity	As Per BOM
SWITCHING CAPACITY	17.6 Gbps
64 Byte Packet Forwarding rate	13.1 Mpps
Switching method	ERPS (Ethernet Ring Protection Switching)
MAC address table	16K
Packet Buffer Size	1MB

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Honeywell	CUSTOMER: THE INDURE PRIVATE LIMITED	
	CONSULTANT: DCPL, KOLKATA	
	END USER : WBPDC	
	PROJECT : SAGARDIGHI THERMAL POWER EXTENSION (AHP)	Page 9 of 26

A4 Color Printer

General	MAKE	HP
	MODEL	HP color LaserJet Pro 400
	Description	A4 COLOUR LASER PRINTER
	Quantity	4 no's
	Dimension	15.9 by 19.1 by 12.7 in
Performance Specification	Print speed, black (normal quality mode)	Up to 21 ppm
	First page out (black)	As fast as 17 sec
	First page out (color)	As fast as 17 sec
	Print resolution, black	Up to 600 x 600 dpi
	Print resolution, color	Up to 600 x 600 dpi
	Print technology	Laser
	Monthly Duty Cycle	Up to 40,000 pages
	Print languages, standard	HP PCL 6, HP PCL 5c, HP postscript level 3
	Processor speed	600 MHz
	Memory, standard	128 MB
	Memory, maximum	384 MB
	Paper tray(s), standard	2
	Media sizes, standard	Tray 1: Letter, legal, executive, 8.5 x 13 in, 3 x 5 in, 4 x 6 in, 5 x 8 in, envelopes (No 10, Monarch); Tray 2, optional Tray 3: Letter, legal, executive, 8.5 x 13 in, 4 x 6 in, 5 x 8 in, envelopes (No 10, Monarch); Automatic duplexer: Letter, legal, executive, 8.5 x 13 in
	Media types	Paper (bond, brochure, colored, glossy, letterhead, photo, plain, preprinted, prepunched, recycled, rough), postcards, transparencies, labels, envelopes

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Honeywell	CUSTOMER: THE INDURE PRIVATE LIMITED	
	CONSULTANT: DCPL, KOLKATA	
	END USER : WBPDC	
	PROJECT : SAGARDIGHI THERMAL POWER EXTENSION (AHP)	Page 10 of 26

	Connectivity	1 Hi-Speed USB 2.0 port; 1 Fast Ethernet 10/100Base-TX network port
	No. of print cartridges	4 no's (Black ,cyan , magenta , yellow)
	ACOUSTIC	Acoustic Power Emissions: 6.5 B(A); Acoustic Power Emissions (Ready): 4.1 B(A); Acoustic Pressure Emissions Bystander (Active, Printing): 51 dB(A); Acoustic Pressure Emissions Bystander (Ready): 27 dB(A)
	PAPER HANDLING	50-sheet multipurpose tray, 250-sheet input tray 2, 150-sheet output bin Input Capacity (standard): Up to 300 Sheets, Up to 50 transparencies, Up to 10 envelopes Input Capacity (maximum): Up to 550 Sheets (with optional tray 3) Output Capacity: Up to 50 Sheets, Up to 50 transparencies, Up to 20 envelopes

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Honeywell	CUSTOMER: THE INDURE PRIVATE LIMITED	
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	END USER : WBPDC	
	PROJECT : SAGARDIGHI THERMAL POWER EXTENSION (AHP)	Page 11 of 26

A3 Color Printer:

General	MAKE	HP
	MODEL	5225DN
	Description	COLOUR LASERJET PRINTER
	Dimension	545(D) X 599(W) X 338(H)mm without tray
	Quantity	2 no.
Performance Specification	Power Consumption Operational	440Watt
	Power Consumption Stand by / Sleep	30 Watt
	Memory Installed/Expandable (Max)	192 MB / 448 MB (max)
	PORT CONNECTIONS	1 Hi-Speed USB 2.0, built-in Fast Ethernet 10/100 Base-T network port
	Client operating systems	Standard: WindowsR 2000, Windows XPR Home, Windows XP Professional, Windows Server 2003, Windows VistaR, Windows XP Media Center, Windows XP Professional x64, Windows 7 (HP UPD only); Mac OS X v 10.3, Mac OS X v 10.4 or higher; Linux (see www.hplip.net); Optional: OS/2, UNIX, Linux
	Data Link Protocol	Ethernet, Fast Ethernet
	Monthly Duty Cycle	up to 75,000 pages
	Processor	540 MHz
	Media Size	A3, A4, A5, A6, RA3, SRA3, B4, B5, 8k, 16k, 10 x 15cm
	Max Media Capacity	100-sheet multipurpose tray 1, 250-sheet tray 2
	Print Speed	Up to 20 ppm
	Output Capacity	250 sheet face down Output bin
	Max Resolution (B&W)	600 dpi x 600 dpi
	Max Resolution (Color)	600 dpi x 600 dpi

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Honeywell	CUSTOMER: THE INDURE PRIVATE LIMITED	
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	END USER : WBDCL	
	PROJECT : SAGARDIGHI THERMAL POWER EXTENSION (AHP)	Page 12 of 26

Op.Cond	Max Operating Temperature	81 degree F
	Max Operating Humidity	10 to 70 percent
	Altitude	upto 3,100m

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Honeywell	CUSTOMER: THE INDURE PRIVATE LIMITED	
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	END USER : WBPDC	
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DI RTP:

GENERAL	Make	UL
	Model No	UL16DIF-D25
	Quantity	As per BOM
	Description	16 Channel Digital Input RTP
ELECTRICAL SPECIFICATIONS	No. of channels	16.
	Signal mode	Non-Redundant.
	Configuration	Source type.
	System Voltage	24V DC.
	Field Voltage	24VDC/110VAC/230VAC
	Fuse type	20 mm Long glass fuse (Horizontal fuse base).
	Fuse rating Per channel	100mA
	Input status indication	3mm Green Led.
DIMENSIONAL/ TERMINATION DATA	Dimension (L x W x H)	182mm x 126mm x 90mm
	Termination (Field side)	Screw terminals 2.5 mm ² Conductor
	Termination (System side)	25 Pin male D-sub connector (O/E/N make).
	Mounting	Universal rail
ENVIRONMENTAL/ COMPLIANCE DATA	Ambient operating temp.	-20°C to +60°C
	Relative humidity	Max. 90% (Non-condensing).

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Honeywell	CUSTOMER: THE INDURE PRIVATE LIMITED	
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DO RTP:

GENERAL	Make	UL
	Model No	UL16DO1WFI1CO-D25-2C
	Quantity	As per BOM
	Description	16 Channel Digital Output RTP
INTERNAL DATA	No. of channels	16.
	Signal mode	Non-Redundant.
	Configuration	Source type.
	System Voltage	24V DC.
	Field Voltage	24VDC/ 230V AC.
	Fuse type	20 mm Long glass fuse (Horizontal fuse base).
	Contact fuse rating	5A.
	Input status indication	3mm Green Led.
	Relay Contact Type	DPDT (2C/O).
	Relay Contact Rating	5A@ 30VDC/ 230VAC.
	Current consumption/ channel	25 mA.
DIMENSIONAL/ TERMINATION DATA	Dimension (L x W x H)	355mm × 126mm × 90mm.
	Termination (Field side)	Screw terminals 2.5 mm ² Conductor (Phoenix make/ Weidmuller make/Equivalent).
	Termination (System side)	25 Pin male D-sub connector (O/E/N make).
	Mounting	Universal rail
ENVIRONMENTAL/ COMPLIANCE DATA	Ambient operating temp.	-20°C to +60°C
	Relative humidity	Max. 90% (Non-condensing).

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Honeywell	CUSTOMER: THE INDURE PRIVATE LIMITED	
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	END USER : WBPDC	
	PROJECT : SAGARDIGHI THERMAL POWER EXTENSION (AHP)	Page 15 of 26

DIODE O RING: 10 A

GENERAL SPECS	Building Width	32 mm
	Make	Phoenix
	Model	QUINTORING 24DC/2X10/1X20
	Degree of efficiency at max. load	>97%
	Installation advice	Clearance: side ≥ 2 cm; above/below ≥ 10 cm
	Operating temperature	-25 °C...+70 °C
	Depth	125 mm
	Mounting position, installation notice	horizontal DIN rail NS 35, EN 60715
DIMENSION	Depth	125 mm
	Width	32 mm
	Height	130 mm
	Quantity	As per BOM
Input	Input voltage (voltage mode input)	24 V DC max.
	Input current	2 x 0...10 A max.
	Input voltage (voltage mode input)	24 V DC max.
output	Output power	240 W
	Output voltage, note	Uin - 0.5 V typical
	Output current	0...20 A max. or 10 A max. for redundant operations
Temperatures	Operating temperature	-25 °C to 70 °C (> 60 °C Derating: 2,5 %/K)
	Storage temperature	-40 °C ... 85 °C
Approvals	Institute (cULus)	UL/C-UL Recognized UL 60950
	Institute (cURus)	UL ANSI/ISA-12.12.01 Class I, Division 2, Groups A, B, C, D (Hazardous Location)

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Honeywell	CUSTOMER: THE INDURE PRIVATE LIMITED	
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	PROJECT : SAGARDIGHI THERMAL POWER EXTENSION (AHP)	Page 16 of 26

DIODE O RING: 20 A

GENERAL SPECS	Building Width	38 mm
	Make	Phoenix
	Model	QUINTORING 24DC/2X20/1X40
	Degree of efficiency at max. load	>98%
	Installation advice	Clearance: side ≥ 2 cm; above/below ≥ 10 cm
	Operating temperature	-25 °C...+70 °C
	Depth	125 mm
	Mounting position, installation notice	horizontal DIN rail NS 35, EN 60715
DIMENSION	Depth	125 mm
	Width	38 mm
	Height	130 mm
	Quantity	As per BOM
Input	Input voltage (voltage mode input)	24 V DC max.
	Input current	2 x 0...20 A max.
	Input voltage (voltage mode input)	24 V DC max.
output	Output power	480 W
	Output voltage, note	Uin - 0.2 V typical
	Output current	0...40 A max. or 20 A max. for redundant operations
Temperatures	Operating temperature	-25 °C to 70 °C (> 60 °C Derating: 2,5 %/K)
	Storage temperature	-40 °C ... 85 °C
Approvals	Institute (cULus)	UL/C-UL Recognized UL 60950
	Institute (cURus)	UL ANSI/ISA-12.12.01 Class I, Division 2, Groups A, B, C, D (Hazardous Location)

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DIODE O RING: 40 A

GENERAL SPECS	Building Width	66 mm
	Make	Phoenix
	Model	QUINTORING 24DC/2X40/1X80
	Degree of efficiency at max. load	>98%
	Installation advice	Clearance: side ≥ 2 cm; above/below ≥ 10 cm
	Operating temperature	-25 °C...+70 °C
	Depth	125 mm
	Mounting position, installation notice	horizontal DIN rail NS 35, EN 60715
DIMENSION	Depth	125 mm
	Width	66 mm
	Height	130 mm
	Quantity	As per BOM
Input	Input voltage (voltage mode input)	24 V DC max.
	Input current	2 x 0...40 A max.
	Input voltage (voltage mode input)	24 V DC max.
output	Output power	960 W
	Output voltage, note	Uin - 0.2 V typical
	Output current	0...80 A max. or 40 A max. for redundant operations
Temperatures	Operating temperature	-25 °C to 70 °C (> 60 °C Derating: 2,5 %/K)
	Storage temperature	-40 °C ... 85 °C
Approvals	Institute (cULus)	UL/C-UL Recognized UL 60950
	Institute (cURus)	UL ANSI/ISA-12.12.01 Class I, Division 2, Groups A, B, C, D (Hazardous Location)

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FO Converter:

GENERAL SPECS	MAKE	Santelequip
	MODEL	SC09FEN S SC DC24 I
	Quantity	As Per BOM
PERFORMANCE SPECIFICATION	Communication Standard	IEEE802.3 10 Base-T, 100Base-T, 100Base-F
	OPTICAL Port	SC,ST OR FC
	Optic port rate	100Mbps
	RJ45 port rate	10/100Mbps
	Relative humidity	5% to 95% Non-Condensing
	Power input	24VDC
	Power Consumption	< 4W
	Quantity	As per BOM
	Dimension H×W×D	74mm x 30mm x 130mm
	Mounting	Mounting DIN RAIL

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Honeywell	CUSTOMER: THE INDURE PRIVATE LIMITED	
	CONSULTANT: DCPL, KOLKATA	
	END USER : WBPDCCL	
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IRIG-B TO NTP CONVERTER:

GENERAL	SERVICE	IRIG-B TO NTP CONVERTER
	QUANTITY	As per BOM
	MANUFACTURER	SERTEL
	MOUNTING TYPE	Panel/Table Top/Wall
	MODEL	T-CON-300-I2N
ELECTRICAL	Voltage source	90-260 V AC/DC
SYSTEM SPECIFICATION	Input Signal source	IRIG-B (from field)
	Input Connector	BNC (female)
	Output signal	NTP/SNTP
	Output Connector	RJ-45
ENVIRONMENTAL SPECIFICATION	OPERATING TEMPERATURE	-10 °C to 55°C
	OPERATING HUMIDITY	0-90% RH, non-condensing
PHYSICAL SPECIFICATION	HEIGHT]	44.4 mm
	WIDTH	485 mm
	DEPTH	325 mm
	Material	Diecast Aluminum

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FO CABLE:

General	Type of Fiber Optic Cable	Single mode
	Make	Aksh Optic Fiber
	Fiber Type	OS 1 as per G.652D Standard
	Fiber Count	6 core per fiber
Performance Specification	Application	Out door
	Laying Through	Conduit 
	Dia	12.5 + 0.8 mm
	Quantity	1 Lot 
	Attenuation at at 1310 nm	< 0.38 Max & < 0.35 Average
	Outer Sheath	T = 1.5 mm Nominal
	Min. Bending Radius Unloaded	15 x D, D = Cable Diameter
	Min. Bending Radius Loaded	20xD (250 mm)
	Outer Sheath	HDPE – UV RESISTANT, ANTI RODENT & ANTI TERMITE

DATASHEET OF BOUGHTOUTS	DOC NO : P15U007-101-15	REV –3
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Honeywell	CUSTOMER: THE INDURE PRIVATE LIMITED	
	CONSULTANT: DCPL, KOLKATA	
	END USER : WBPDC	
	PROJECT : SAGARDIGHI THERMAL POWER EXTENSION (AHP)	Page 21 of 26

Serial to Modbus Converter:



GENERAL	SERVICE	RS232 to RS485 Modbus Converter
	QUANTITY	As per BOM
	MANUFACTURER	Santelequip
	MOUNTING TYPE	Din Rail
	MODEL	SC04U
COMMUNICATION	INPUT / OUTPUT	RS232
	OUTPUT / INPUT	RS485 / RS422. 2 Wire & 4 Wire
	SPEED	1200 to 115000 bps
	CABLE DISTANCE	1200 m
	INDICATION	LED's for TX & RX and Power
MECHANICAL	CONNECTOR – Input	DB9 Female
	CONNECTOR – Output	Screw Terminals
	CONNECTOR – Power	Screw Terminals
	ENCLOSURE	Phoenix Bopla, ABS, DIN Rail Mounting 55 x 110 x 75 mm [L D H]
	WEIGHT	175g
ELECTRICAL	POWER CONSUMPTION	1.2 watts
	POWER SUPPLY Options	1. 230V AC, Range 90 to 260V AC (Default) 2. 230V AC, Range 90 to 260V AC and 220V DC, Range 180 to 260V or 3. 3. 230V AC, Range 165 to 265V AC and 220V DC, Range 110V DC to 265V DC 4. 24V DC, 48V DC
OPERATING CONDITIONS	TEMPERATURE	0 - 55° C
	RELATIVE HUMIDITY	5 – 95 % - non-condensing

DATASHEET OF BOUGHTOUTS	DOC NO : P15U007-101-15	REV –3
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Honeywell	CUSTOMER: THE INDURE PRIVATE LIMITED	
	CONSULTANT: DCPL, KOLKATA	
	END USER : WBDCL	
	PROJECT : SAGARDIGHI THERMAL POWER EXTENSION (AHP)	Page 22 of 26

KVM Extender:



GENERAL	SERVICE	USB KVM Extender
	QUANTITY	As per BOM
	MANUFACTURER	ATEN
	MOUNTING TYPE	Din Rail
	MODEL	CE700A
CONSOLE PORTS	KEY BOARD	1xUSB Type A Female (White)
	VIDEO	1xHDB-15 Female (Blue)
	MOUSE	1xUSB Type A Female (white)
ELECTRICAL	POWER CONSUMPTION	DC 5.3V. 2.34W
	Unit to Unit	1x RJ45 Female (Black)
	Power Jack	1x DC Jack
	Video Resolution	1920x1200/1600x1200/1280x1024
ENVIRONMENT	Operating Temp.	0-50 ° C
	Storage Temp.	-20 – 60 ° C
	Humidity	0-80% RH Non-Condensing
PHYSICAL	Housing	Metal
	Weight	0.32 Kg
	Dimensions	20.0 x 8.36 x 2.63 cm (LxWxH)

DATASHEET OF BOUGHTOUTS	DOC NO : P15U007-101-15	REV –3
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Honeywell	CUSTOMER: THE INDURE PRIVATE LIMITED	
	CONSULTANT: DCPL, KOLKATA	
	END USER : WBPDC	
	PROJECT : SAGARDIGHI THERMAL POWER EXTENSION (AHP)	Page 23 of 26

STP Cable:

GENERAL	Cable Type	STP
	QUANTITY	
	MANUFACTURER	Dlink/Finolex
	Conductor Metal	Solid Bare Copper

MODBUS Cable:

GENERAL	Cable Type	STP type
	QUANTITY	3000 meter
	MANUFACTURER	Dlink/Finolex
	Conductor Metal	Solid Bare Copper

DATASHEET OF BOUGHTOUTS	DOC NO : P15U007-101-15	REV -3
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Honeywell	CUSTOMER: THE INDURE PRIVATE LIMITED	
	CONSULTANT: DCPL, KOLKATA	
	END USER : WBPDC	
	PROJECT : SAGARDIGHI THERMAL POWER EXTENSION (AHP)	Page 24 of 26

FO Patch Chord:

3

GENERAL	Service	Patch Chord
	MANUFACTURER	Computech
	TYPE	SC-SC Type connector

Honeywell	CUSTOMER: THE INDURE PRIVATE LIMITED	
	CONSULTANT: DCPL, KOLKATA	
	END USER : WBPDC	
	PROJECT : SAGARDIGHI THERMAL POWER EXTENSION (AHP)	Page 25 of 26

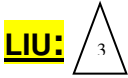
Panel Internal Wires:



GENERAL	PRODUCT	Single core PVC insulated electric cables
	GRADE	Upto & including 1100V AC
	MANUFACTURER	RR Cable
	TEST STANDARD	IS:694
	CLASS OF CONDUCTOR	COPPER CLASS 5, IS 8130, IEC60228
SIZE	SUPPLIED SIZES	1.5 sq mm
		2.5 sq mm
		4 sq mm
		6 sq mm
		10 sq mm

DATASHEET OF BOUGHTOUTS	DOC NO : P15U007-101-15	REV -3
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Honeywell	CUSTOMER: THE INDURE PRIVATE LIMITED	
	CONSULTANT: DCPL, KOLKATA	
	END USER : WBDCL	
	PROJECT : SAGARDIGHI THERMAL POWER EXTENSION (AHP)	Page 26 of 26



GENERAL	PRODUCT	LIU
	PORT	12 Port
	MANUFACTURER	Computech/OFC tech

DATASHEET OF BOUGHTOUTS	DOC NO : P15U007-101-15	REV -3
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Dell 23 Monitor | E2314H (58.42 cm, 23" VIS)

Dell 23 Monitor

Model E2314H

58.42 cm / 23" monitor

Reliable and efficient, offering essential features for home and business

The Dell 23 Monitor is your smart choice for essential productivity features, unmatched reliability, and energy-saving environment and regulatory compliance. In addition, the Dell 23 Monitor offers family entertainment features and the security of Dell's Limited Hardware Warranty¹ and Advanced Exchange Service².

The Dell 23 Monitor is perfect for:

- Task workers for basic office productivity
- Educational institutions (computer labs, classrooms)
- Call centers, data entry centers, sales order input and administration
- Home use for Internet and shopping online

The Dell 23 Monitor | E2314H (58.42 cm , 23" VIS) offers you:

Essential features for business productivity and home entertainment

- Get awesome screen clarity when you view applications and spreadsheets on-screen with the Full HD resolution and fast 5ms (typical) response time of the Dell 23 Monitor.
- Easily access peripherals and devices with the plug and play VGA and DVI-D ports.
- Adjust the monitor up to 5.5° forward or 22° backward to your preferred angle with the smooth tilt function.

Environmentally conscious and energy efficient

- For business
 - Help reduce your business' carbon footprint and environmental impact with the Dell 23 Monitor, which meets latest regulatory and environmental standards.
 - Experience the increased energy efficiency of the Dell 23 Monitor with a low power consumption of 22 W (typical).
- For home
 - Since the power-efficient Dell 23 Monitor meets the latest ENERGY STAR®, TCO Certified Displays, EPEAT® Gold**, and CEL requirements, be assured that it can help save you money.
- Manage power consumption wisely with PowerNap, a brightness dimming feature which, when enabled, puts the monitor into sleep mode when it's not in use.

Reliability you can count on

- For business
 - Benefit from Dell's quality monitoring and rigorous product development stages which help ensure reliability, avoid downtime and keep your workforce productive.
 - Plan transitions easily with Dell's stable product life cycles and worldwide product availability.
- For home
 - Enjoy seamless compatibility with Dell monitors and Dell systems and accessories.
 - Experience reliability thanks to Dell's rigorous product testing and high quality standards.
- Enjoy peace of mind with Dell's Limited Hardware Warranty¹ and Advanced Exchange Service².



Dell 23 Monitor | E2314H (58.42 cm, 23" VIS)

Designed with essential features
for home and business



Maximum tilt 5.5° forward or 22° backward.

Connectors



Upgrade to P2314H⁵

In-plane switching panel technology,
DisplayPort connectivity

What's in the box?

Monitor, stand, VESA screw cover, power cable, drivers, documentation media, Quick Set Up Guide and Safety Information, VGA cable, DVI-D cable.

Dell recommends that customers dispose used computer hardware, including monitors, in an environmentally sound manner. Potential methods include reuse of parts or whole products and recycling of product, components and/or materials. For more information, please visit http://dell.com/recycling_programs and www.dell.com/environment



Dell 23 Monitor | E2314H (58.42 cm, 23" VIS)

Display

Model number	E2314H
Viewable image size (diagonal)	58.42 cm (23 inches)
Active display area	
Horizontal	509.8 mm (20.07 inches)
Vertical	286.7 mm (11.29 inches)
Maximum resolution	Full HD 1920 x 1080 at 60 Hz
Aspect ratio	16:9
Pixel pitch	0.265 mm
Brightness (typical)	250 cd/m ²
Color gamut (typical)	83% ³
Color depth	16.7 million colors
Contrast ratio (typical)	1000:1
Viewing angle (typical) (vertical/horizontal)	160°/ 170°
Response time (typical)	5 ms (black to white)
Panel technology	TN (active matrix – TFT LCD)
Backlight	LED

Connectivity

Connectors	VGA, DVI-D (HDCP)
Dell soundbar ⁴ (optional)	AC511
Remote asset management	Yes, via Dell Display Manager

Design features

Stand	Tilt only (Typical: 5° forward or 21° backward; Maximum: 5.5° forward or 22° backward)
VESA mounting support (wall mount kit sold separately)	100 mm x 100 mm
Security	Security lock slot and stand lock (security lock not included)

Power

AC input voltage/frequency/current	100 to 240 VAC/50 or 60 Hz ± 3 Hz/1.5 A (typical)
Power consumption	22W (typical)
Power consumption standby/sleep mode	<0.5 W

Dimensions (with stand)

Height	405.4 mm (15.96 inches)
Width	546.2 mm (21.50 inches)
Depth	165.5 mm (6.52 inches)

Weight

Weight (panel only – no stand)	3.13 kg (6.89 lb)
Weight (with stand)	4.22 kg (9.28 lb)
Shipping weight	5.50 kg (12.10 lb)

Standard service plan

- 3 years Advanced Exchange Service²
& Limited Hardware Warranty¹

Environmental compliance

ENERGY STAR®, TCO Certified Displays, EPEAT® Gold**, China Energy Label, WEEE, ErP (EuP) Standards, Korea E-Standby

^{*}Registered in US and Canada only.

^{**}EPEAT Gold registered in the U.S. EPEAT registration varies by country. See www.epeat.net for registration status by country.

¹ For a copy of the Limited Hardware Warranty, write Dell USA LP, Attn: Warranties, One Dell Way, Round Rock, TX 78682 or see dell.com/warranty.

² Advanced Exchange Service: Replacement part/unit dispatched, if needed, following completion of phone/online diagnosis.

Fee charged for failure to return defective unit. Availability varies. Other conditions apply.

³ Color gamut (typical) is based on CIE1976 (83%) and CIE1931 (72%) test standards.

⁴ Only compatible with AC511 soundbar. Launch date for soundbar varies across countries. Please check with your country sales representatives for more information.

⁵ Please check with your sales representative for availability of upgrade product.

Based on Ad #A13001968 dell.com/monitors

Product availability varies by country. Please contact your Dell representative for more information.



Dell OptiPlex 3020

The Dell OptiPlex 3020 provides great customer value and performance, featuring 4th Generation Intel® Core™ processors for reliable workplace productivity while also delivering peace of mind with best-in-class security.

The essential computing experience

Empower your workforce with the Dell OptiPlex 3020, Dell's newest budget-friendly desktop, developed to meet your users' workplace requirements. Available with up to Intel® Core™ i5 Processors, Intel® HD Graphics 4600, and dual monitor capabilities, the Dell OptiPlex 3020 provides the vehicle for increased productivity and collaboration especially when combined with Dell essential accessories such as award winning monitors, keyboards, mice, and headsets for a complete computing experience.

Inspired, reliable design

The OptiPlex 3020 provides you with the choice of two durable chassis sizes designed to integrate seamlessly into your office environment. Built with thumbscrews for tool-less serviceability makes the OptiPlex 3020 one of the most serviceable commercial-level desktops on the market. Dell OptiPlex is synonymous with stability, longer lifecycles and easily managed transitions. Dell's chassis have undergone Dell reliability testing to help ensure they are built to last.

A single point of contact

By partnering with Dell for your client needs, that's what you get for every stage of client management – from Dell Configuration services through product recycling. Dell OptiPlex 3020 comes with award-winning Dell ProSupport™ for 24X7 access to Dell experts to help keep your systems up and running.

Best-in-class security

Your data is your company's most important asset. Dell OptiPlex 3020 provides peace of mind for IT with comprehensive, best-in-class security features. Dell OptiPlex 3020 provides TCG certified TPM for secure credential storage, and ships with Dell Data Protection | Security Tools and Dell Data Protection | Protected Workspace for advanced authentication and leading edge malware prevention, and can protect data on any device, across external media and in the cloud with optional Dell Data Protection | Encryption, available factory-installed.

Easy manageability

Help save time and provide IT efficiency with Dell manageability features. Easily manage your OptiPlex fleet with tight integration into Microsoft System Center and Dell KACE appliances. Save time and eliminate guesswork with Dell automated tools and utilities for deploying, monitoring and updating systems. In addition, you can rely on Dell Services to configure, deploy and help manage your systems.

Integrated complete solution

The OptiPlex 3020 supports Dell Cloud Client Computing solutions such as client hosted virtualization and virtual remote desktop providing your business with more flexibility – especially for businesses with remote locations.

OptiPlex 3020 MT/SFF Technical Specifications ¹			
Processors ¹	Intel® 4 th generation Core™ i5 Quad Core, Core™ i3 Dual Core, Pentium® Dual Core and Celeron® Dual Core		
Chipset	Intel® H81 Chipset		
Operating System Options ¹	Microsoft® Windows 8 Standard 64-bit, Microsoft® Windows 8 Pro 64-bit Microsoft® Windows 8.1 Standard 64-bit, Microsoft® Windows 8 Pro 64-bit Microsoft® Windows 7® Home Premium SP1 (32/64 bit), Microsoft® Windows 7® Professional SP1 (32/64 bit), Microsoft® Windows 7® Ultimate SP1 (32/64 bit); Ubuntu		
Graphics ²	Integrated Intel® HD Graphics 4600 (with select CPUs); supports optional discrete graphics solutions from AMD		
Memory ³	2 DIMM slots; Non-ECC dual-channel 1600MHz DDR3 SDRAM, supports up to 16GB		
Networking	Integrated Realtek® RTL8151GD Ethernet LAN 10/100/1000; supports optional PCIe 10/100/1000 network card, optional wireless 802.11n card		
I/O Ports	2 external USB 3.0 ports (rear) and 6 external USB 2.0 ports (2 front, 4 rear); 1 Serial port (optional); 1 PS/2 (optional); 1 RJ-45; 1 VGA; 1 DisplayPort 1.2; 1 Mic-in & 1 Headphone out (front); 1 Mic-in/Line-in & 1 Line-out(rear)		
Removable Media Options	Supports optional optical disc drives and media card reader options		
Hard Drives ⁴ Options	Hard Disk Drives: up to 1TB Supports Solid State Drives, Hybrid and Hybrid Opal SED FIPS No Hard Drive – Supports Dell Cloud Desktop diskless option		
Chassis		Minitower (MT)	Small Form Factor (SFF)
	Dimensions (H x W x D) Inches/(cm)	14.2 x 6.9 x 16.4 / (36.0 x 17.5 x 41.7)	11.4 x 3.7 x 12.3 / (29.0 x 9.3 x 31.2)
	Min. Weight (lbs/kg)	20.68 / 9.4	13.2 / 6.0
	Number of Bays	2 internal 3.5" 2 external 5.25"	1 internal 3.5" 1 external 5.25" (slimline)
	Expansion Slots	1 full height PCIe x16 3 full height PCIe x1	1 half height PCIe x16 1 half height PCIe x1
	Power Supply ⁵ Unit (PSU)	Standard 290W PSU Active PFC or optional 290W up to 90% Efficient PSU (80 PLUS Gold); ENERGY STAR compliant, Active PFC	Standard 255W PSU Active PFC or optional 255W up to 90% Efficient PSU (80 PLUS Gold); ENERGY STAR compliant, Active PFC
Recommended	Dell Monitors:		



Dell OptiPlex 3020

OptiPlex 3020 MT/SFF Technical Specifications ¹	
Accessories	Dell 22 Monitor – P2214H, E2214H Dell 23 Monitor – E2314H Dell 20 Monitor – P2014H, E2014H Dell Dual Monitor Stand – MDS14, Dell Single Monitor Arm – MSA14
	Keyboards & Mice: Dell Standard Keyboard, Dell Multimedia Keyboard, Dell Smartcard Keyboard, Dell USB Mouse, Dell Laser Mouse
	Dell 1TB Portable Hard Drive
	Dell Security Lock – LP500
Security	Trusted Platform Module ⁶ (TPM) 1.2, Dell Data Protection SecurityTools, Dell Data Protection Encryption, Chassis lock slot support, Chassis Intrusion Switch, Setup/BIOS Password, I/O Interface Security, optional Smart Card keyboards, Intel® Trusted Execution Technology, Intel® Identity Protection Technology, Intel® Ant-Theft Technology, KACE Security, Dell Secure Works, BIOS support for optional Computrace ⁷
Systems Management Options ⁸	In-Band Systems Management
Environmental & Regulatory Standards	Environmental Standards (eco-labels): ENERGY STAR 5.2, EPEAT Registered ¹⁰ , CECP, WEEE, Japan Energy Law, South Korea E-standby, South Korea Eco-label (for SFF only), EU RoHS, China RoHS Other Environmental Options: Carbon Off-set; Asset Resale and Recovery Service.
Warranty and Service	Limited Hardware Warranty ¹¹ ; Standard Next Business Day On Site Service after Remote Diagnosis ¹² (term varies by region); Optional 3-year Dell ProSupport™ for IT; 4 year and 5 year service and support options ¹³
Configuration Services	Factory image load, BIOS customization, hardware customization, asset tagging, reporting

Discover professional class desktops at Dell.com/OptiPlex

1. Offering may vary by region. Some items may be available post-RTS. Offering may vary by region and configuration. For complete details, refer to the Technical Guidebook published on www.dell.com. 2. System Memory and Graphics: Significant system memory may be used to support graphics, depending on system memory size and other factors. 3. 4GB or Greater System Memory Capability: A 64-bit operating system is required to support 4GB or more of system memory. 4. Hard Drive: GB means 1 billion bytes and TB equals 1 trillion bytes; actual capacity varies with preloaded material and operating environment and will be less. 5. Computrace: Not a Dell offer. Certain conditions apply. For full details, see terms and conditions at www.lockforlaptops.com. 6. Please refer to www.epeat.net for specific country registration rating and participation. 7. Limited Hardware Warranty: For copy of Ltd Hardware Warranty, write Dell USA LP, Attn: Warranties, One Dell Way, Round Rock, TX 78682 or see www.dell.com/warranty. 8. Onsite Service after Remote Diagnosis: Remote Diagnosis is determination by online/phone technician of cause of issue; may involve customer access to inside of system and multiple or extended sessions. If issue is covered by Limited Hardware Warranty (www.dell.com/warranty) and not resolved remotely, Technician and/or part will be dispatched, usually within 1 business day following completion of Remote Diagnosis. Availability varies. Other conditions apply. 9. Dell Services: Availability and terms of Dell Services vary by region. For more information, visit www.dell.com/servicedescription



xStack Integration

- Virtual Stacking of up to 32 units
- Embedded D-Link SIM for integration of all the xStack switches
- 1 Physical Stacking of up to 8 units

VLAN

- 4K VLAN support
- Selective Q-in-Q and VLAN Translation
- MAC-based VLAN
- 802.1v protocol-based VLAN

Security

- L2/L3/L4 Multi-Layer Access Control
- External RADIUS/TACACS+ Authentication
- SSH/SSL
- Guest VLAN
- Web-based Access Control (WAC)
- MAC-based Access Control (MAC)
- IP-MAC-Port Binding (IMPB)
- D-Link Safeguard Engine
- Supports Microsoft NAP

VoIP Deployment

- Auto Voice VLAN
- Highest priority
- DSCP QoS for VoIP application

Quality of Service

- 802.1p Priority Queues/Multi-Layer QoS
- IP Multicast support for bandwidth-intensive application

Traffic Monitoring & Bandwidth Control

- Port Mirroring
- Traffic Segmentation
- Bandwidth Control down to 64bps
- Broadcast Storm Control
- Committed Information Rate
- RMON v1/v2 support

Management

- Web-based GUI
- Command Line Interface (CLI)
- Telnet Server
- SNMP v1, v2c, v3
- D-Link Single IP Management (SIM)
- D-View 6.0 Network Management System

L2+ Ethernet Stacks

The DES-3528/3552 xStack series are enhanced L2+ access stackable switches designed to connect end-users in a secure SMB (small and medium size business) or enterprise network. These switches provide physical stacking, multicast and enhanced security, making it an ideal access layer solution. The DES-3528/3552 xStack Series can seamlessly integrate with L3 core switches to form a multi-level network structure consisting of a high-speed backbone and centralized servers.

Flexible & Cost-Effective Ethernet Stack

The DES-3528/3552 series provide the option of 24 or 48 10/100Mbps Ethernet ports and up to four Gigabit uplinks per switch. Users requiring connections to devices such as IP phones, network cameras and wireless APs can deploy the DES-3528P or DES-3552P, which provides 24 10/100Mbps PoE ports. Eight of these PoE ports provide up to 30watts per port, while the remaining adhere to the 802.3af standard (15.4watt output per port), giving administrators the ability to connect to the 802.3af standard devices as well as the 802.3at pre-standard equipment such as the 802.11n AP. The two combo 10/100/1000BASE-T SFP slots on the front panel provide flexible copper or fiber Gigabit connection. The two 10/100/1000BASE-T ports on the back panel are designed for flexible dual usage. They can be used either as stacking ports with 4Gbps bidirectional stacking bandwidth, or can simply be used as copper Gigabit uplinks. Physical stacking capability allows administrators to add up to eight switch units per stack on a scalable expansion basis. This series offers an attractive stackable switch alternative to the expensive chassis-based solution.

Comprehensive Security

The DES-3528/3552 series provide users with the latest security features such as 802.1X Guest VLAN, MAC-based Access Control (MAC) and Web-based Access Control (WAC). 802.1X Guest VLAN is a comprehensive end-point security solution for user authentication/authorization and WAC guarantees granular network access control with a user-friendly authentication mechanism. The IP-MAC-Port Binding feature allows administrators to bind a source IP address with an associated MAC and also define the port number to enhance user access control. With the DHCP Snooping feature, the switch automatically learns IP/MAC pairs by snooping DHCP packets and saving them to the IMPB white list. This keeps the network secure and auditable. The D-Link Safeguard Engine identifies and prioritizes "CPU interested" packets to prevent malicious traffic from interrupting normal network flows and protects switch operation.

Enhanced Network Performance & Availability

The DES-3528/3552 series targets SMB/enterprise customers who require a high level of network security and maximum uptime. It offers 4K VLAN, advanced selective Q-in-Q, as well as delivering progressive QoS capability for mission-critical applications and multicast services. The switches offer superior performance and availability through the latest Spanning Tree protocol, optional redundant power, and Loopback Detection (D-Link's advanced technology for preventing loops without the presence of STP).

User-friendly & Ecosystem-friendly

The DES-3528/3552 series uses D-Link's Web GUI 2.0, an easy-to-use web interface, and configuration wizards to minimize administrators' learning curve and make deployments easier to plan and implement. Utilizing the latest generation of chipsets, the DES-3528/3552 series optimizes power consumption to reduce energy costs and contribute to a greener environment. In addition, the fanless design of the DES-3528 and DES-3528DC ensures quiet operation, ideal for deployment in open spaces. The DES-3528P, DES-3552, and DES-3552P are equipped with a Smart Fan feature. This feature allows for the built-in fans to automatically turn on at a certain temperature, providing continuous, reliable and eco-friendly operation of the switches.



Technical Specifications		DES-3528	DES-3528DC	DES-3528P
				
Interface	10/100BASE-TX Ports	24		
	10/100/1000BASE-T Ports	2		
	Combo 10/100/1000BASE/SFP Ports	2		
	RS-232 Console Port	1		
	PoE Support	–	–	Per 10/100BASE-TX Port ¹
	Gigabit & 100BASE-FX Fiber Support On SFP	✓		
Performance	Switching Capacity	12.8 Gbps		
	64-Byte Packet Forwarding Rate	9.5 Mpps		
Physical & Environmental	Size	19-inch Standard Rack-Mount Width, 1U Height		
	MTBF	203,785 hours	419,736 hours	345,226 hours
	Heat Dissipation	69.9 BTU per hour	62.68 BTU per hour	1723 BTU per hour
	Power Input	100 to 240 VAC, 0.5 A (max.)	48 VDC, 0.6 A (max.)	100 to 240 VAC, 6.3 A (max.)
	Power Consumption	20.5 watts (max.)	18.38 watts (max.)	505.1 watts (max.)
	Optional Redundant Power Supply	DPS-200	–	DPS-600
	Dimensions (W x D x H)	441 x 210 x 44 mm		
	Weight	2.51 kg (5.53 lbs)	2.52 kg (5.55 lbs)	5.42 kg (11.94 lbs)
	Operating Temperature	0 to 50 °C ²	0 to 45 °C	0 to 50 °C
	Storage Temperature	-40 to 70 °C		
	Operating Humidity	5% to 95% non-condensing		
	EMI	FCC Class A, CE Class A, C-Tick, VCCI		
	Safety	CB, UL / cUL		
	Acoustics	0 dB	0 dB	48.2 dB at max. speed of fan
	3rd Party Certification	MEF 9,14 EPL, EVPL, ELAN		

¹ Ports 1 to 8 support 802.3af and pre-standard 802.3at, and ports 9 to 24 support 802.3af only

² Operating Temperature is 0 to 45 °C for H/W versions below A3

Technical Specifications

DES-3552

DES-3552P



Interface	10/100BASE-TX Ports	48	
	10/100/1000BASE-T Ports	2	
	Combo 10/100/1000BASE/SFP Ports	2	
	RS-232 Console Port	1	
	PoE Support	–	Per 10/100BASE-TX Port ³
	Gigabit & 100BASE-FX Fiber Support On SFP	✓	
Performance	Switching Capacity	17.6 Gbps	
	64-Byte Packet Forwarding Rate	13.1 Mpps	
Physical & Environmental	Size	19-inch Standard Rack-Mount Width, 1U Height	
	MTBF	380,412 hours	200,486 hours
	Heat Dissipation	112.87 BTU per hour	1727.94 BTU per hour
	Power Input	100 to 240 VAC, 0.8 A (max.)	100 to 240 VAC, 6.9 A (max.)
	Power Consumption	33.1 watts (max.)	506.4 watts (max.)
	Optional Redundant Power Supply	DPS-200	DPS-600
	Dimensions (W x D x H)	441 x 210 x 44 mm	441 x 370 x 44 mm
	Weight	4.09 kg (9.01 lbs)	6.52 kg (14.37 lbs)
	Operating Temperature	0 to 50 °C ⁴	0 to 50 °C
	Storage Temperature	-40 to 70 °C	
	Operating Humidity	5% to 95% non-condensing	
	EMI	FCC Class A, CE Class A, C-Tick, VCCI	
	Safety	CB, UL / cUL	
	Acoustics	35.1 dB at max. speed of fan	50.9 dB at max. speed of fan
	3rd Party Certification	MEF 9,14 EPL, EVPL, ELAN	

³ Ports 1 to 8 support 802.3af and pre-standard 802.3at, and ports 9 to 48 support 802.3af only

⁴ Operating Temperature is 0 to 45 °C for H/W versions below A2



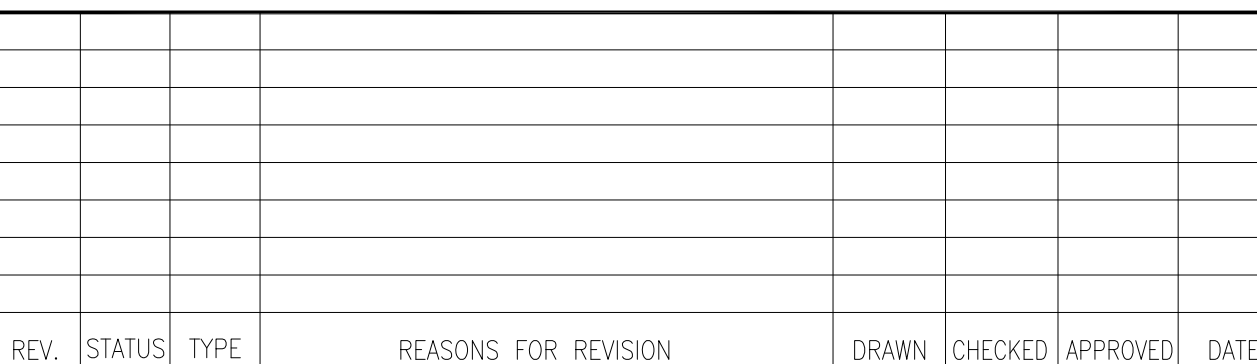
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of
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for

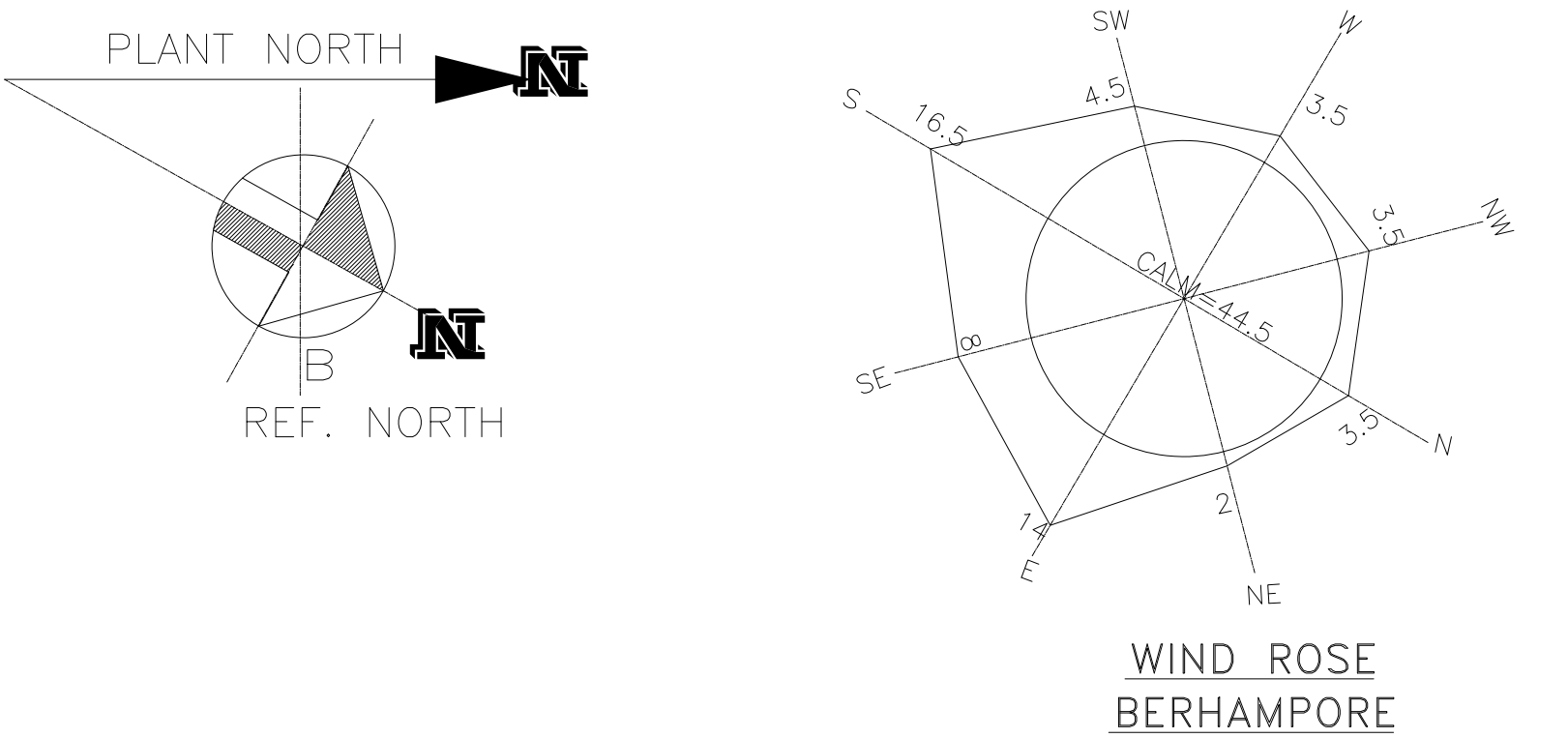
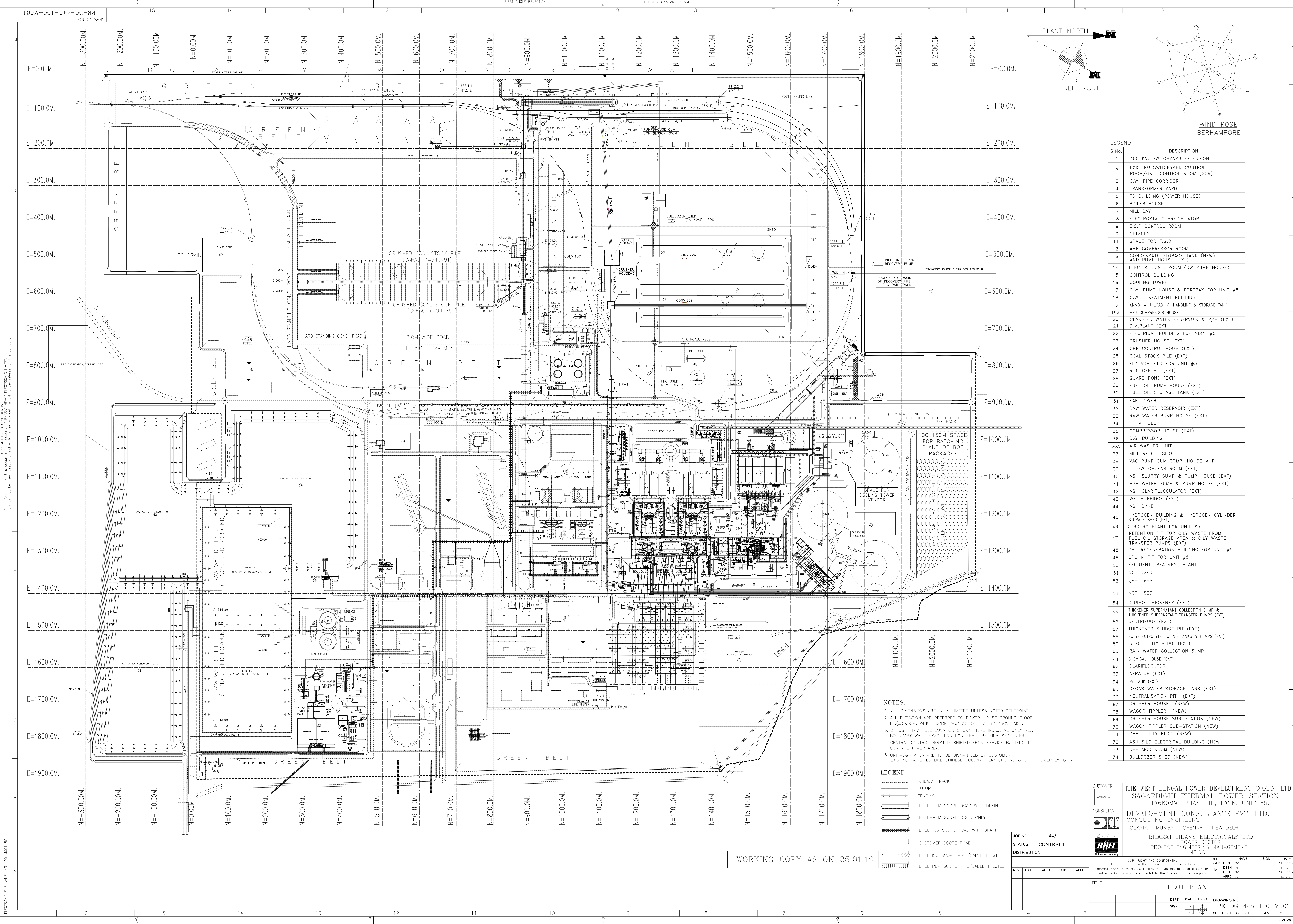
SAGARDIGHI THERMAL POWER PROJECT
1 x 660 MW UNIT NO. 5, PHASE – III
WEST BENGAL POWER DEVELOPMENT CORPORATION LIMITED

Content:

Drawings for Tender Purpose

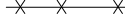
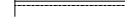
- a. Coal Flow Diagram (total 01 sheets)
- b. Progressive Plot Plan (01 sheet)





LEGEND	
S.No.	DESCRIPTION
1	400 KV. SWITCHYARD EXTENSION
2	EXISTING SWITCHYARD CONTROL ROOM/GRID CONTROL ROOM (GCR)
3	C.W. PIPE CORRIDOR
4	TRANSFORMER YARD
5	TG BUILDING (POWER HOUSE)
6	BOILER HOUSE
7	MILL BAY
8	ELECTROSTATIC PRECIPITATOR
9	E.S.P. CONTROL ROOM
10	CHIMNEY
11	SPACE FOR F.G.D.
12	AHP COMPRESSOR ROOM
13	CONDENSATE STORAGE TANK (NEW) AND PUMP HOUSE (EXT)
14	ELEC. & CONT. ROOM (CW PUMP HOUSE)
15	CONTROL BUILDING
16	COOLING TOWER
17	C.W. PUMP HOUSE & FOREBAY FOR UNIT #5
18	C.W. TREATMENT BUILDING
19	AMMONIA UNLOADING, HANDLING & STORAGE TANK
19A	WRS COMPRESSOR HOUSE
20	CLARIFIED WATER RESERVOIR & P/H (EXT)
21	D.M. PLANT (EXT)
22	ELECTRICAL BUILDING FOR NDCT #5
23	CRUSHER HOUSE (EXT)
24	CHP CONTROL ROOM (EXT)
25	COAL STOCK PILE (EXT)
26	FLY ASH SILO FOR UNIT #5
27	RUN OFF PIT (EXT)
28	GUARD POND (EXT)
29	FUEL OIL PUMP HOUSE (EXT)
30	FUEL OIL STORAGE TANK (EXT)
31	FAE TOWER
32	RAW WATER RESERVOIR (EXT)
33	RAW WATER PUMP HOUSE (EXT)
34	11KV POLE
35	COMPRESSOR HOUSE (EXT)
36	D.G. BUILDING
36A	AIR WASHER UNIT
37	MILL REJECT SILO
38	VAC PUMP CUM COMP. HOUSE-AHP
39	LT SWITCHGEAR ROOM (EXT)
40	ASH SLURRY SUMP & PUMP HOUSE (EXT)
41	ASH WATER SUMP & PUMP HOUSE (EXT)
42	ASH CLARIFLUCCULATOR (EXT)
43	WEIGH BRIDGE (EXT)
44	ASH DYKE
45	HYDROGEN BUILDING & HYDROGEN CYLINDER STORAGE SHED (EXT)
46	CTSD RO PLANT FOR UNIT #5
47	RETENTION PIT FOR OILY WASTE FROM FUEL OIL STORAGE AREA & OILY WASTE TRANSFER PUMPS (EXT)
48	CPU REGENERATION BUILDING FOR UNIT #5
49	CPU N-PIT FOR UNIT #5
50	EFFLUENT TREATMENT PLANT
51	NOT USED
52	NOT USED
53	NOT USED
54	SLUDGE THICKENER (EXT)
55	THICKENER SUPERNATANT COLLECTION SUMP & THICKENER SUPERNATANT TRANSFER PUMPS (EXT)
56	CENTRIFUGE (EXT)
57	THICKENER SLUDGE PIT (EXT)
58	POLYELECTROLYTE DOSING TANKS & PUMPS (EXT)
59	SILO UTILITY BLDG. (EXT)
60	RAIN WATER COLLECTION SUMP
61	CHEMICAL HOUSE (EXT)
62	CLARIFLOCUTOR
63	AERATOR (EXT)
64	DM TANK (EXT)
65	DEGAS WATER STORAGE TANK (EXT)
66	NEUTRALISATION PIT (EXT)
67	CRUSHER HOUSE (NEW)
68	WAGOR TIPPLER (NEW)
69	CRUSHER HOUSE SUB-STATION (NEW)
70	WAGON TIPPLER SUB-STATION (NEW)
71	CHP UTILITY BLDG. (NEW)
72	ASH SILO ELECTRICAL BUILDING (NEW)
73	CHP MCC ROOM (NEW)
74	BULLDOZER SHED (NEW)

NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETRE UNLESS NOTED OTHERWISE.
2. ALL ELEVATION ARE REFERRED TO POWER HOUSE GROUND FLOOR EL.(+0.00M), WHICH CORRESPONDS TO RL-34.5M ABOVE MSL.
3. 2 NOS. 11KV POLE LOCATION SHOWN HERE INDICATIVE ONLY NEAR BOUNDARY WALL, EXACT LOCATION SHALL BE FINALISED LATER.
4. CENTRAL CONTROL ROOM IS SHIFTED FROM SERVICE BUILDING TO CONTROL TOWER AREA.
5. UNIT-3&4 AREA ARE TO BE DISMANTLED BY CUSTOMER. EXISTING FACILITIES LIKE CHINESE COLONY, PLAY GROUND & LIGHT TOWER LYING IN

LEGEND	
	RAILWAY TRACK
	FUTURE
	FENCING
	BHEL-PEM SCOPE ROAD WITH DRAIN
	BHEL-PEM SCOPE DRAIN ONLY
	BHEL-ISG SCOPE ROAD WITH DRAIN
	CUSTOMER SCOPE ROAD
	BHEL ISG SCOPE PIPE/CABLE TRESTLE
	BHEL PEM SCOPE PIPE/CABLE TRESTLE

WORKING COPY AS ON 25.01.19

CUSTOMER:	THE WEST BENGAL POWER DEVELOPMENT CORPN. LTD. SAGARDIGHI THERMAL POWER STATION 1X860MW, PHASE-III, EXTN. UNIT #5.			
CONSULTANT:	DEVELOPMENT CONSULTANTS PVT. LTD. CONSULTING ENGINEERS KOLKATA, MUMBAI, CHENNAI, NEW DELHI			
CLIENT:	BHARAT HEAVY ELECTRICALS LTD POWER SECTOR PROJECT ENGINEERING MANAGEMENT NOIDA			
DEPT CODE	CHN	NAME	SK	DATE
DESIGN	SK			14.01.2019
PP	PP			14.01.2019
CHK	SK			14.01.2019
APPD	SK			14.01.2019

TITLE	PLOT PLAN		
DEPT. SIGN	SCALE 1:200	DRAWING NO.	PE-DG-445-100-M001
		SHEET	01 OF 01
		REV.	P0

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ELECTRONIC FILE NAME: 445_100_M001_3D



ANNEXURE#5
of
Wagon Tippler Package
for

SAGARDIGHI THERMAL POWER PROJECT
1 x 660 MW UNIT NO. 5, PHASE – III
WEST BENGAL POWER DEVELOPMENT CORPORATION LIMITED

Content:

- HSE (total 16 sheets)
- PPE Manuals (total 142 sheets)



HSE Management System Manual For Vendors

Doc. No. IS/HSE/Vendor

Site Safety Plan

CONFORMATION TO BE GIVEN BY VENDORS ALONGWITH TECHNICAL OFFER

Bharat Heavy Electricals Limited
Industrial Systems Group
Prof. C.N.R.Rao Circle, Malleswaram,
BANGALORE 560 012
Phone: 080 - 3365096, Fax: 080 - 3365096

Regd. Office: "BHEL House" Siri Fort, New Delhi - 110 049.

ISG BANGALORE	Written by: R.BABU	Approved by: M.R.Thakurta Management Representative
REV. NO. 00	Sheet No. 1 of 16	DATE: 28 th October 2006



HSE Management System Manual For Vendors

Table of Contents

DOCUMENT NO.	DESCRIPTION
IS/HSE/Vendor	1. Details of Project
	2. Health, Safety and Environment Policy
	3. Roles of Site Personnel
	4. Safety Awareness & Training:
	5. Site Safety Inspection:
	6. Emergency Preparedness and Response Plan:
	7. Electrical Safety Inspection:
	8. Transportation and Material Handling Equipment:
	9. Erection of equipment:
	10. Commissioning of equipment:
	11. Use of Personal Protective Equipment (PPE):
	12. Housekeeping:
	13. Accident Investigation and Reporting:
	14. Protection against Fire
	15. Protection against Noise
	16. Welding Sets
	17. Civil / Structural Work
	18. FIRE FIGHTING PLAN
	19. NOISE STANDARDS
	20. List of Applicable Statutory / Regulatory requirements
	21. SAFETY DECLARATION BY SUB-CONTRACTOR
Checklist / Formats : Available at BHEL Site for use	
IS-QII-4-409/010	SAFETY DECLARATION BY SUB-CONTRACTOR
IS:HSE:CL01	CHECK LIST FOR WORKING AT HEIGHT
IS:HSE:CL02	CHECK LIST FOR HOUSE KEEPING
IS:HSE:CL03	CHECK LIST FOR SCAFFOLDING
IS:HSE:CL04	CHECK LIST FOR GENERAL SAFETY INSPECTION
IS:HSE:CL05	CHECK LIST FOR HEAVY MATERIAL HANDLING EQUIPMENT INSPECTION
IS:HSE:CL06	CHECK LIST FOR ARC WELDING TRANSFORMER
IS:HSE:CL07	CHECK LIST FOR DC ARC WELDING GENERATOR

Note:

1. This Site Safety Plan is to be used at all Sites. Project Specific Details and Site Organization Chart are to be added in Section -1.
2. The Checklists provided are to be used and maintained as records.
3. These documents and records are verifiable for compliance under Quality & HSE systems.

ISG BANGALORE	Written by: R.Babu	Approved by: M.R.Thakurta Management Representative
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	HSE Management System Manual For Vendors
IS/HSE/Vendor	SITE SAFETY PLAN

1. Details of Project

1.	Name of the Project & Site	
2.	Job Number	
3.	Customer	
4.	Overall Scope of work: Design / Supply / Installation	Civil Structural Mechanical Electrical & Instrumentation Others
5.	Project Schedule	Starting Date: Completion Date:
6.	Erection & Commissioning Machinery / Tools / Instruments Required:	
7.	Sub-Contractor Details	Name of the Sub-contractor Job order No.: Duration of Completion:
8.	Name of Vendor's Residence Manager	Attach Site Organization Chart Will be furnished on award of Contract
9.	Designated Safety Officer of Vendor	Will be furnished on award of Contract

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	HSE Management System Manual For Vendors
IS/HSE/Vendor	SITE SAFETY PLAN

2. HEALTH, SAFETY & ENVIRONMENTAL POLICY OF BHEL ISG (TO be adhered by the VENDOR)

The Management is committed to be an environmentally sound company in its activities, products, services and to provide safe and healthy working environment to all employees as an integral part of business performance and strive towards zero accident through:

- Compliance with applicable Legislation and Regulations.
- Promoting the objective to minimize waste generation and to conserve/reduce/reuse resources such as raw materials, water and power.
- Enhancement of Environmental, Safety and Occupational Health awareness amongst employees, customers and suppliers by proactive communication and training.
- Continual improvement through periodical review of EMS and OHSAS to ensure its suitability, adequacy and effectiveness.
- Regular evaluation and proactive measures for prevention of accidents/ occupational diseases.
- Communication of HSE Policy to all employees and interested parties.
- Coordination with concerned agencies/regulatory bodies engaged in Occupational Health, Safety & Environmental activities.

3. Roles of Site Personnel :

Resident Manager:

- Ensuring that Health, Safety, Environment Management System (HSEMS) requirements are implemented and maintained at sites in consultation with BHEL Resident Manager. He shall have commensurate authority and organisational freedom in that regard.
- He shall report on the performance of the HSEMS to the BHEL Resident Manager for review.
- Identification and evaluation of Environmental Aspects & Impacts, Occupational Health & Safety Hazards and assess Risks at Site.

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.IS/HSE/Vendor	SITE SAFETY PLAN

Duties & Responsibilities of the Designated Safety Officer at Site:

- To advise on safety aspects to all personnel at site including vendor's sub-contractors.
- To carry out Site safety inspection in order to observe the physical conditions of work and the work practices and procedures followed by Sub-contractors and to render advise on measures to be adopted for removing the unsafe physical conditions and preventing unsafe actions by sub-contractor's personnel.
- To organize / verify the availability of personal protective equipment
- To investigate select accidents
- Co-ordinate hazard and risk management
- Furnish Safety Declaration to BHEL Resident Manager.
- Impart Safety Training to all site personnel including sub-contractors working at Site in consultation with BHEL Resident Manager.

4. Safety Awareness & Training:

Safety Awareness and consciousness among workers, supervisors and executives is imparted by the Designated Safety Officer of BHEL / Sub-contractor. This is done by way of following.

- Talk on Safety issues as per Site Safety Plan
- Posters and Notices at prominent places
- Display of warning boards
- Creating awareness and response for emergencies like Fire, Shock, accidents, dangerous occurrences and on First-aid, Emergency assistance agencies and their contact telephone numbers etc.
- Use of Personnel Protective Equipment

5. Site Safety Inspection:

Designated Safety Officer will inspect the site on Daily basis

- To identify unsafe conditions and unsafe actions by the labourers and bring to the notice of Resident Manager. The main objective of the Daily Inspection is to rectify the potentially dangerous situations and avoid occurrence of any incident.
- To suggest suitable remedial action to correct the unsafe conditions / acts.
- To use appropriate checklists to verify and record the safety observations.

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	HSE Management System Manual For Vendors
IS/HSE/Vendor	SITE SAFETY PLAN

6. Emergency Preparedness and Response Plan:

- Use the **Emergency Preparedness and Response Plan IS/HSE/EPR/01** available at site to be followed
- First aid kits are to be kept in the site office or the locations in the vicinity of work place. The kit is to be maintained. Records of FIRST AID treatment given to be maintained in a register.
- Whoever first notices the accident occurrence shall immediately notify the same to Designated Safety Officer / Other BHEL executives.
- Determine the area of accident and organize for evacuation of the personnel.
- Organize for sending the injured person to nearby First-aid / Health Center / Hospitals depending on the emergency.
- In the event of fire organize for extinguishing the fire using the apparatus available and for major fire notify the local / nearby Fire Station.

7. Electrical Safety Inspection:

- All the electrical distribution system, sub system, relevant protection unit at electrically powered machines and tools are inspected periodically including earthing at two points, to avoid electrical shocks.
- Checklist for House keeping and General safety inspection is to be followed for periodical inspection.
- For safe operation all the Electrical portable tools and devices are connected with Earth Leakage Circuit Breaker (ELCB) protection at Distribution Board and continuity of earth connection is to be ensured.
- The ELCBs are tested periodically and records of such tests are maintained.
- After each inspection the filled up check list date wise is to be retained by Resident Manager.

8. Transportation and Material Handling Equipment:

- Checklist of Inspection of Material Handling Equipment shall be used and records are to be maintained.

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	HSE Management System Manual For Vendors
.IS/HSE/Vendor	SITE SAFETY PLAN

9. Erection of equipment:

- Erection Manual is to be followed during erection of equipment.
- SAFETY MANAGEMENT AT ERECTION SITES
- Checklists provided by BHEL, shall be used and records are to be maintained.

10. Commissioning of equipment:

- The instructions given in Commissioning Manual are to be followed during Commissioning of Standard equipment.
- Wherever Checklists are provided, the same shall be used and records are to be maintained.

11. Use of Personal Protective Equipment (PPE):

- Personal Protective Equipment shall be provided by Vendor for all workers, labour and other site personnel during construction.
- The PPE in use shall conform to IS or other relevant standard and the same shall be discarded in case it is damaged or worn out. The specification of PPE is available with BHEL site & HQs for reference.

LIST OF required Personnel Protective Equipment (PPE) to be maintained at site

HEAD PROTECTION	• Industrial Safety Helmet • Leather Cap
FACE PROTECTION	• Plastic face Shield, • Welding Hand Shield, • Welding Head Shield.
EAR PROTECTION	• Ear muff / plugs
EYE PROTECTION	• Goggles, • Welding filter lens
BODY PROTECTION	• Aluminised suit, • Fire proximity suit, • Apron, • Safety Belt, • Pant & Jerkin, • Cotton coverall, • Over coat,

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	- Gloves, - Barrier cream, - Hand cleanser,
FOOT PROTECTION	- Kevlar Safety Boots, - Gum Boots (Knee Boots), - Safety Shoes, - Cotton socks, - leather leg guard.
NASAL PROTECTION	- Cloth & Paper respirator (Dust & Mist), - Chemical fume respirator, - Welding fume respirator, - Canister gas mask, - Air line respirator, - Self breathing apparatus.

12. Housekeeping:

- The Site Safety Plan document Reference No. IS/HSE/SSP/01 available at BHEL site office is to be followed regarding the Housekeeping of materials, equipment. Scraps etc. during construction.
- The Housekeeping Checklist IS:HSE:CL02 available in this document shall be followed and records are to be maintained.

13. Accident Investigation and Reporting: To be followed as per BHEL Guidelines given below in consultation with BHEL & Customer:

GUIDELINES FOR RESIDENT MANAGERS ON CONTRACT LABOUR, SAFETY & ACCIDENT REPORTING SYSTEM

CONTRACT LABOUR

- Form V under Contract Labour (Regulation and Abolition Act) may be arranged from the customer, who is the principal employer, in the name of sub-contractor directly and ensure that the sub-contractor shall obtain licence under Contract Labour (Regulation and Abolition Act).
- Ensure PF coverage in respect of all the contract labour deployed by our sub-contractors.

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- 3) Ensure ESI coverage, wherever applicable, in respect of all the contract labour deployed by our sub-contractors.
- 4) Ensure gate pass issued by the customer to all the contract labour deployed by our sub-contractors
- 5) Ensure Insurance coverage in lieu of Workmen's Compensation in respect of all the contract labour deployed by our sub-contractors.
- 6) Ensure payment of minimum wages, bonus, gratuity and other statutory payments to the contract labour

SAFETY

- 7) Ensure compliance of all safety measures/aspects by sub-contractors.
- 8) Ensure usage of PPEs as per the safety norms for each work / site by BHEL employees and persons engaged by the sub-contractors.
- 9) Ensure compliance of safety aspects envisaged in HSE Management System Manual.

ACCIDENT REPORTING SYSTEM

- 10) In case of major accidents resulting in serious bodily injury or death, report the same to Business Manager, DGM (HR), etc. at HQ immediately.
- 11) If the accident happened to any contract labour, please obtain a letter from the contractor regarding the accident and forward the same to the customer after obtaining concurrence from HQ.
- 12) In case of Fatal Accident to contract labour, local Police shall be informed by the contractor under intimation to you.
- 13) In case of Fatal Accident to BHEL employee, local Police shall be informed by the Resident Manager under intimation to HQ.
- 14) Obtain the concurrence and approval of Business Manager & DGM(HR) before signing any Accident Notice Forms under the Factories Act or Form EE under Workmens Compensation Act, etc. or any other documents related to the accident.
- 15) In case of Fatal Accident to contract labour, ensure contractor shall arrange for postmortem and other formalities and hand over the body to the relatives.

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- 16) In case of major accidents resulting in serious bodily injury or death to contract labour, Resident Manager shall forward the prescribed Form (Notice of Accidents or Dangerous Occurrences Resulting in Death or Bodily Injury under the Factories Act Rules of the state in which site is situated) filled and submitted by the sub-contractor to the Customer for onward transmission to the Assistant Labour Commissioner and other concerned Authorities within the prescribed time limit.
- 17) In case of major accidents resulting in serious bodily injury or death to BHEL employee, Resident Manager shall fill and submit the prescribed Form (Notice of Accidents or Dangerous Occurrences Resulting in Death or Bodily Injury under the Factories Act Rules of the state in which site is situated) to the Customer for onward transmission to the Assistant Labour Commissioner and other concerned Authorities within the prescribed time limit.
- 18) Contact Resident Manager / HR executive of Power Sector Site at the same location, if available, and take their assistance, in case if they had already handled a similar accident case at the same location.
- 19) Ensure providing the details like age (date of birth), wages of the person met with an accident and injured or expired.
- 20) Ensure depositing of Workmens Compensation amount decided by the authority under The Workmens Compensation Act with the Commissioner of Workmens Compensation by the contractor or their Insurance Company.
- 21) Inform HQ regarding the payment of Workmens Compensation to the dependents of the person expired through the authorities.

HSE ACCIDENT / INCIDENT REPORTING

- 22) Strictly comply with section 17.0 of HSE Management System Manual in respect of Accident / Incident reporting system
- 23) Submit the Accident / Incident Report format to HQ immediately after occurrence of accident.
- 24) Submit the Accident / Incident Investigation Report format to HQ after completion of the investigation

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14. Protection against Fire

- The GENERAL SAFETY INSPECTION Checklist - IS:HSE:CL04 available in BHEL Site shall be followed and records are to be maintained.
- **FIRE FIGHTING PLAN** Extract from: Chapter 4 – Internal Appliances of Fire Protection Manual Issued by Tariff Advisory Committee Bombay as elaborated below is to be followed for finalizing the requirement of fire extinguishers at site. (Please refer point No. 18 below.)

15. Protection against Noise

- The Equipment used at Construction site must follow the acceptable ambient noise level as detailed below in **NOISE STANDARDS**.

16. Welding Sets

- Whenever Welding sets are brought by the contractor to site, the healthiness of the equipment is to be checked and inspected and the record is to be maintained as per the checklist IS:HSE:CL06 and CL07 available at BHEL site..

17. Civil / Structural Work

Wherever Civil work is involved the following work instructions / checklist are available at BHEL site to be referred and followed.

- **Work Instructions for Civil Work at Site** – IS:CW:01, Rev:01, Dated 04.09.1996.
- Safety Management at Construction Site Document no. IS/HSE/SSM/01, Rev.00 Dated 11.06.1996
- Checklist for Scaffolding IS:HSE:CL03
- Checklist for Working at Height IS:HSE:CL01
- Formats for Field Quality Plan IS:CW:01, Rev.02, Dated 15.05.1997.

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18. FIRE FIGHTING PLAN

Extract from: Chapter 4 – Internal Appliances of Fire Protection Manual Issued by
Tariff Advisory Committee Bombay.

Class of Fire	Suitable type of appliances
A. Fire in ordinary combustible (wood, vegetable, fiber, paper etc.)	Chemical extinguishers of soda acid, gas / expelled water and anti-freeze types and water buckets.
B. Fires in flammable liquids, paints, grease, solvents etc.	Chemical extinguishers of Foam, Carbon Dioxide and Dry powder type and sand buckets.
C. Fire in gaseous substances under pressure	Chemical Extinguishers of Carbon Dioxide and Dry Powder Type.
D. Fire in reactive Chemicals, active metals	Special type of Dry Powder extinguishers and sand buckets.
E. Fire in electrical equipments.	Chemical Extinguishers of Carbon Dioxide and Dry Powder Type and sand buckets.
Clause 4.1.3.2	One 9 litre Water / Sand Bucket for every 100 sq.metre area
Clause 4.1.3.5.1	One no. of Not less than 2 kg, Dry Powder CO ₂ extinguisher within 15 metres of apparatus for rooms containing electrical transformers & switchgear.
Clause 4.1.3.5.2	One no. 5 kg, Dry Powder CO ₂ extinguisher within 15 metres of Motors / other Electrical equipment.

The following example will illustrate the method of determining the number of fire extinguishers required to give adequate protection for a given property:

Light engineering workshop (light hazards).

Area: 315m X 112m = 35300 sq.m

Type of fire:

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1. Class A Fire due to normal combustibles
2. Class B Fire due to existence of spray painting process and storage of flammable liquids
3. Class E fire due to two electrical DB and motors

Number of appliances

Basic protection

353 buckets and

59 water type extinguishers

OR

90 Water type extinguishers if buckets are dispensed with.

For Class B fires 2 Water type extinguishers are replaced by 2 Foam Extinguishers.

For Class E fires 6 Dry Powder Extinguishers are provided. Thus the total no. of fire extinguishers are

Water type: 88

Foam type: 2

Dry powder type: 6

TOTAL 96

Reference Standards for Fire Extinguishers:

Sl.No.	Standard / Year	Description
1.	IS940 : 1989	Specifications of Portable fire extinguisher, water type (gas cartridge)
2.	IS2171 : 1999	Specifications of Portable fire extinguisher, Dry powder (Cartridge type)
3.	IS2878 : 1986	Specifications for Fire extinguisher, Carbon Di-oxide Type (Portable & trolley mounted)
4.	IS10204 : 2001	Specifications of Portable fire extinguisher, mechanical foam type
5.	IS10658 : 1999	Specifications for Higher capacity Dry powder Fire extinguisher (Trolley mounted)
6.	IS13385 : 1992	Specifications for Fire extinguisher, 50 capacity wheel mounted water type (Gas Cartridge)
7.	IS13386 : 1992	Specifications for Fire extinguisher, 50 l capacity, mechanical foam type

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8.	FPM / June 1995	Fire Protection Manual (Part-I) By Tariff Advisory Committee
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19. NOISE STANDARDS

NOISE : (Ambient standard)

Area Code	Category of Area	Limit in dB (A) Leq	
		Day time (6 AM to 9 PM)	Night time (9 PM to 6 AM)
A	Industrial area	75	70
B	Commercial area	65	55
C	Residential area	55	45
D	Silence Zone	50	40

Silence Zone is defined as area upto 100 metres around such premises as hospitals, educational institutions and courts.

Source: EPA Notification [G.S.R. 1063(E), DT. 26th Dec. 1989]

Domestic appliances & Construction equipment acceptable noise level:

Sl.No.	Type of Appliances	Standard dB(A)
1.	Window Air-conditioner to 1 Ton to 1.5 Tons	68
2.	Air Coolers	60
3.	Refrigerators	46
4.	Diesel Generators for Domestic Purpose	85-90
5.	Compactors (Rollers) Front Loaders, Mixers, Crane movable, Vibrators and Saws	75

Source: EPA Notification [G.S.R. 742(E), DT. 30th Aug. 1990]

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IS/HSE/Vendor	SITE SAFETY PLAN

20. List of Applicable Statutory / Regulatory Requirements:

Sl.No.	Standard	Applicable or Not
1.	Indian Electricity Rules, 1956	Yes/ No
2.	The Electricity Act, 2003	Yes/ No
3.	The Indian Electricity Act, 1910	Yes/ No
4.	The Motor Vehicle Act, 1988	Yes/ No
5.	The Central Motor Vehicle Rules, 1989	Yes/ No
6.	The Gas Cylinder Rules 2004	Yes/ No
7.	The Environment (Protection) Act, 1986	Yes/ No
8.	The National Environment Tribunal Act 1995	Yes/ No
9.	The Noise Pollution (Regulation & Control) Rules, 2000	Yes/ No
10.	Battery (Management and Handling) Rules, 2000	Yes/ No
11.	Ozone Depleting Substances (Regulation and Control) Rules, 2000	Yes/ No
12.	Pollution Control Act, Rules and Notifications, September 2001	Yes/ No
13.	Pollution Control Law – Environmental Standard for Ambient Air, Automobiles, Fuels, Industries and Noise – July 2000	Yes/ No
14.	CBIP Guidelines	Yes/ No
15.	Contract Labour (Regulation and Abolition) Act, 1970	Yes/ No
16.	Factories Act, 1948 with relevant state rules	Yes/ No
17.	The Buildings And Other Construction Workers (Regulation Of Employment And Conditions Of Service) Act, 1996	Yes/ No
18.	The Inter-state Migrant Workmen (Regulation Of Employment And Conditions of Service) Act, 1979	Yes/ No
19.	The Child Labour (Prohibition and Regulation) Act, 1986	Yes/ No
20.	Minimum Wages Act, 1948 with relevant state amendments	Yes/ No
21.	Payments of Wages Act, 1936	Yes/ No
22.	Payment of Bonus Act, 1965	Yes/ No
23.	Payment of Gratuity Act, 1972	Yes/ No
24.	Employees' State Insurance Act, 1948	Yes/ No
25.	The Employees' Provident Funds And Miscellaneous Provisions Act, 1952	Yes/ No
26.	Fatal Accidents Act, 1855	Yes/ No
27.	The Personal Injuries (Compensation Insurance) Act, 1963	Yes/ No
28.	Workmen's Compensation Act, 1923	Yes/ No
29.	The Industrial Disputes Act, 1947	Yes/ No
30.	Environmental Standards for TPP	Yes/ No
31.	The Indian Boilers Act, 1923	Yes/ No
32.	Tariff Advisory Committee - Insurance	Yes/ No
33.	Hazardous goods TAC	Yes/ No

ISG BANGALORE	Written by: R.Babu	Approved by: M.R.Thakurta Management Representative
REV. NO. 00	Sheet No. 15 of 16	DATE: 28 th October 2006

	HSE Management System Manual For Vendors
.IS/HSE/Vendor	SITE SAFETY PLAN

21. SAFETY DECLARATION BY SUB-CONTRACTOR

1. Name of Sub-contractor
2. Work Order No.
3. Nature of work
4. Project
5. Number of workers deployed

Category:		
1.	-	Nos.
2.	-	Nos.
3.	-	Nos.
4.	-	Nos.
6. Number of workers attended safety induction training.
7. Safety appliances issued to workmen

Name of the appliances:	
2. Safety Helmet	
3. Safety Boots	
4. Hand gloves	
5. Safety belts	
6. Safety goggles	
7. Dust masks	
8. First Aid box provided at site
9. Safety clearance taken from concerned authority for starting the job.
10. Sand and water provided at the welding station
11. Fire extinguishers provided at site

Signature of sub-contractor with seal

Date:

ISG BANGALORE	Written by: R.Babu 	Approved by: M.R.Thakurta Management Representative 
REV. NO. 00	Sheet No. 16 of 16	DATE: 28 th October 2006



**CORPORATE STANDARD FOR
PERSONAL PROTECTIVE EQUIPMENT
HEAD PROTECTION**

HSE/PPE

Rev. No. 00

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a) INDUSTRIAL SAFETY HELMET

1.0 Scope

This standard covers the requirements of Industrial safety Helmets.

2.0 Compliance with Standards

It shall comply with IS 2925-1984 Reaffirmed 1995.

3.0 Technical Requirement

- 1) The helmet shall be made from strong, rigid, high density fibre glass dielectric material.
- 2) The helmet shall be provided with Harness including Headband, Cradle and Nape Strap/chin strap, ventilation holes and peak (optional).

HARNESS:

- 1) The material for harness shall be sweat resistant and non-irritant.
- 2) The headband shall be not less than 30 mm in width and securely fixed to the shell and crown straps. The headband shall be readily adjustable.
- 3) The headband shall be flitted with anti concussion tapes of not less than 19 mm width, secured at least at 4 anchoring points, forming the cradle.
- 4) The straps shall ensure a clearance of at least 30 mm between the top of the wearers head and inside top of the helmet crown at the smallest size adjustment of the headband and a wearing height of not less than 80 mm at the max. size adjustment of the headband.

CHIN STRAP/ NAPE STRAP:

- 1) The helmet shall be provided either with chinstrap & nape strap.
- 2) The chinstrap shall be of at least 19 mm wide with an adjustment device to maintain tension.
- 3) The nape strap shall be either integral or as an attachment to the headband and adjustable.
- 4) The mass of the complete helmet shall not exceed 400 gms.

Revisions			Approved by : CORPORATE PPE STANDARDISATION COMMITTEE		
Rev. No.	Amnd. No	Reaffirmed	Prepared by Coordination Committee	Issued by Corporate HSE	Date. of Issue 25.08.2006
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S.N.	SIZE	RANGE OF HEADBAND ADJUSTMENT
01.	SMALL	500 - 540 MM
02.	MEDIUM	540 - 590 MM
03.	LARGE	590 - 640 MM

4.0 Sample
Sample shall be supplied along with offer for approval only for first time supplier and supplies made after 3 years.

5.0 Test certificate

5.1 The supplier shall submit the test certificate along with the bulk supply as per IS for

1. Heat Resistance
2. Flammable Resistance
3. Electrical Resistance
4. Impact Resistance
5. Water Absorption

5.2 The test certificate shall also indicate the following.

1. PO number
2. Batch No. & Date

6.0 Packing
The helmet shall be supplied, packed individually for protection from dust & damage

7.0 Marking
The Helmet shall be embossed with

- a) ISI & DGMS marks
- b) Batch No., Month and year of manufacturing.
- c) BHEL emblem shall be embossed at the front side of the helmet in size 40mm x 30mm

8.0 Inspection
Inspection will be carried out at our works with reference to the acceptable sample and test reports. BHEL will inspect at works where ever required.

9.0 Guarantee Certificate
Guarantee Certificate to be given for any manufacturing defects along with its consignment for free replacement with in six months from the date of receipt at stores.

10.0 Enquiry specification
The PI and Enquiry shall have the latest copy of the specification as “Industrial Safety Helmets ” as per BHEL Corporate standard _____”.



**CORPORATE STANDARD FOR
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b) HELMET WITH FACE SHIELD

1.0 Scope

This standard covers the requirements of Industrial safety Helmets fitted with plastic face shield.

2.0 Compliance with Standards

It shall comply IS:2925, Reaffirmed 1995, IS 8521 Part-1 Reaffirmed 1996.

3.0 Technical Requirement

- 1) The helmet shall be made from strong, rigid, high density fibre glass dielectric material.
- 2) The helmet shall be provided with Harness including Headband, Cradle and Nape Strap/chin strap, ventilation holes and peak (optional).

Harness:

- 1) The material for harness shall be sweat resistant and non-irritant.
- 2) The headband shall be not less than 30 mm in width and securely fixed to the shell and crown straps. The headband shall be readily adjustable.
- 3) The headband shall be flitted with anti concussion tapes of not less than 19 mm width, secured at least at 4 anchoring points, forming the cradle.
- 4) The straps shall ensure a clearance of at least 30 mm between the top of the wearers head and inside top of the helmet crown at the smallest size adjustment of the headband and a wearing height of not less than 80 mm at the max. size adjustment of the headband.

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Chin Strap & Nape Strap:

- 1) The helmet shall be provided either with chinstrap & nape strap.
- 2) The chinstrap shall be of at least 19 mm wide with an adjustment device to maintain tension.
- 3) The nape strap shall be either integral or as an attachment to the headband and adjustable.
- 4) The mass of the complete helmet shall not exceed 400 gms.

S.N.	SIZE	RANGE OF HEADBAND ADJUSTMENT
01.	SMALL	500 - 540 MM
02.	MEDIUM	540 - 590 MM
03.	LARGE	590 - 640 MM

Face Shield

- 1) It shall be provided with Face shield made out of clear, transparent plastic material.
- 2) The Face shield should cover fore head to neck to protect from splashing of chemicals and other flying particles

4.0 Sample
Sample shall be supplied along with offer for approval only for first time supplier and supplies made after 3 years.

5.0 Test certificate

5.1 The supplier shall submit the test certificate as per IS along with the bulk supply for.

- 1. Heat Resistance
- 2. Flammable Resistance
- 3. Electrical Resistance
- 4. Impact Resistance
- 5. Water Absorption

5.2 The test certificate shall also indicate the following.

- 1. PO number
- 2. Batch No. & Date

6.0 Packing
The helmet with face shield shall be supplied, packed individually for protection from damage and dust.

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7.0 Marking
The Helmet shall be embossed with

- a) ISI & DGMS marks
- b) Batch No., Month and year of manufacturing.
- c) BHEL emblem shall be embossed at the front side of the helmet in size 40mm x 30mm

8.0 Inspection
Inspection will be carried out at our works with reference to the acceptable sample and test reports, BHEL will inspect at the works where ever required .

9.0 Guarantee Certificate
Guarantee Certificate to be given for any manufacturing defects along with its consignment for free replacement with in six months from the date of receipt at stores.

10.0 Enquiry specification
The PI and Enquiry shall have the latest copy of the specification as “Helmets with Plastic Face shield” as per BHEL Corporate standard _____”.



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c) LEATHER CAP

1.0 Scope

This standard covers the requirement of Leather cap

2.0 Compliance with Standards

It shall comply with the standards

1. Leather as per IS: 6994-1973
2. Lining cloth confirm to IS 1535-1979 Reaffirmed 1998

3.0 Technical Requirement

1. It shall be made out of chrome tanned cow grain leather in black colour.
2. It shall give protection against hot slag, spatters falling from over head welding operations.
3. It shall have 8 segments. Each segment shall have the width 85 cm
4. It shall have good quality khaki lining inside of the crown and peak.
5. The construction and measurement shall be as shown in the drawing.
6. It shall have hollow type formation for the insertion of lace.
7. It shall have lace made out of cow grain leather having a width of 5mm. length 800mm. and thickness 2mm.
8. The stitched portion shall be kept inside.

4.0 Sample

Sample shall be supplied along with offer for approval only for first time supplier and supplies made after 3 years.

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5.0 Test certificate

5.1 The supplier shall submit the test certificate as per IS along with the bulk supply.

5.2 The test certificate also shall indicate the following.

- a. BHEL PO number
- b. Batch No. & Date

6.0 Packing

The Cap shall be supplied, packed individually for protection from damage & dust

7.0 Marking

The Cap shall be marked with the following information

- a. BHEL logo
- b. Supplier identity
- c. Date & year of manufacturing

8.0 Inspection

Inspection will be carried out at our works with reference to the acceptable sample and test report, BHEL will inspect at the works wherever required .

9.0 Guarantee Certificate

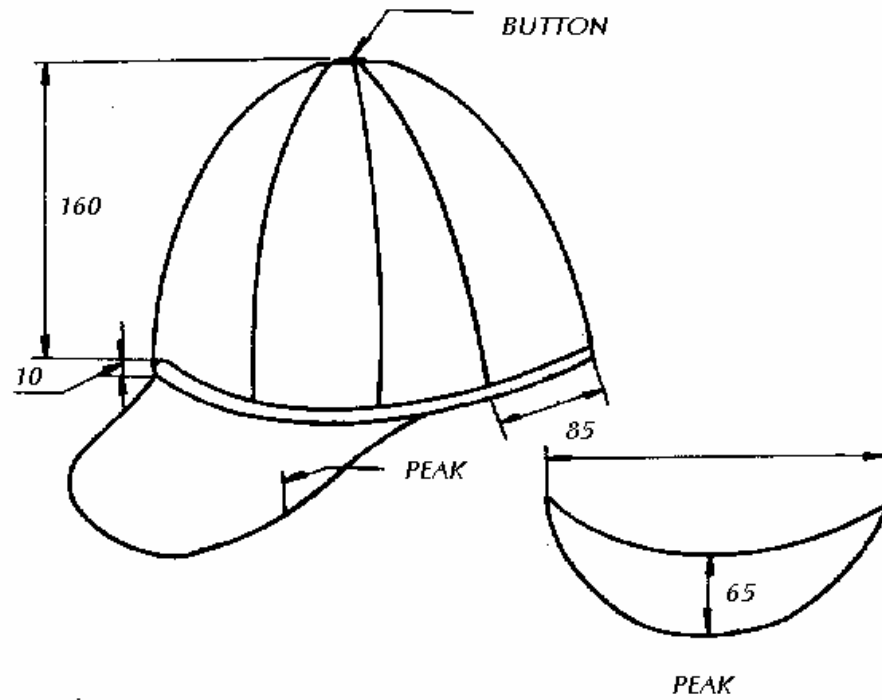
Guarantee Certificate to be given for any manufacturing defects along with its consignment for free replacement with in six months from the date of receipt at stores.

10.0 Enquiry specification

The PI and Enquiry shall have the latest copy of the specification as “Leather cap” as per BHEL Corporate standard _____”.



LEATHER CAP





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d) SPARE HEAD GEAR FOR PLASTIC FACE SHIELD

1.0 General

This standard covers the requirement of spare head gear for plastic face shield

2.0 Compliance with National Standards

It shall comply with the standards IS - 2925-1984 Reaffirmed 1995.

3.0 Quality Requirement

1. It shall have the arrangement allowing the shield to be lowered or raised easily.
2. It shall be provided with thick quality Head band adjustable type made out of either Fiber or Plastic sponge shall be provided at the front and covered with Rexene.
3. It shall be provided with 4mm wing nut, spring attachment for easy positioning.

4.0 Sample

Sample shall be supplied along with offer for approval only for first time supplier and supplies made after 3 years.

5.0 Test certificate

- 5.1 The supplier shall submit the test certificate as per IS along with the bulk supply for
 1. Material quality.
- 5.2 The test certificate shall also indicate the following.
 - a) BHEL PO number
 - b) Batch No. & Date

6.0 Packing

The head gear shall be supplied, packed in good quality box to prevent damage

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7.0

Marking

8.0

Inspection

Inspection will be carried out at our works with reference to the acceptable sample and test reports, BHEL will inspect at the works where ever required.

9.0

Guarantee Certificate

Guarantee Certificate to be given for any manufacturing defects along with its consignment for free replacement with in six months from the date of receipt at stores .

10.0

Enquiry specification

The PI and Enquiry shall have the latest copy of the specification as “Spare Head gear for Face Shield” as per BHEL Corporate standard _____”.



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e) SPARE HEAD GEAR FOR WELDING HELMET

1.0 Scope

This standard covers the requirement of Spare Head Gear For Welding Helmet

2.0 Compliance with Standards

It shall comply with the standards IS 2925-1984 Reaffirmed 1995.

3.0 Technical Requirement

1. It shall have the 4mm wing Nut with spring attachment for easy positioning.
2. It shall have an adjustable Head band made of PVC provided with soft Cellulose sponge at the front side of the Head band which must be covered by Rexene cloth.
3. It shall have a provision to allow the head shield drop gradually and have stopper to arrest the fall.

4.0 Sample

Sample shall be supplied along with offer for approval only for first time supplier and supplies made after 3 years.

5.0 Test certificate

- 5.1 The supplier shall submit the test certificate as per IS along with the bulk supply for
 1. Material quality.
- 5.2 The test certificate shall also indicate the following.
 - a) BHEL PO number
 - b) Batch No. & Date

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6.0

Packing

The head gear shall be supplied, packed in good quality box to prevent damage

7.0

Marking

8.0

Inspection

Inspection will be carried out at our works with reference to the acceptable sample and test reports, BHEL will inspect at the works where ever required.

9.0

Guarantee Certificate

Guarantee Certificate to be given for any manufacturing defects along with its consignment for free replacement with in six months from the date of receipt at stores .

10.0

Enquiry specification

The PI and Enquiry shall have the latest copy of the specification as “Spare Head Gear For Welding Helmet” as per BHEL Corporate standard _____”.



**CORPORATE STANDARD FOR
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FACE PROTECTION**

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a) PLASTIC FACE SHIELD

1.0 Scope

This standard covers the requirement of Plastic Face Shield for Grinding applications and against Chemical Splashes.

2.0 Compliance with Standards

1. It shall comply with IS 8521- 1977 Part-I , Reaffirmed 1996.

3.0 Technical Requirement

1. It shall cover the Forehead and neck to protect the wearer from the splashing of chemicals and other flying particles.
2. It shall be provided with clear, transparent plastic visor of 1mm thick, 300mm wide and 250 mm length. fixed in between grooved type fore head and bottom shields.
3. The visor shall be free from scratches and defects to facilitate clear visibility.
4. It shall have tilting arrangement allowing the visor to be lowered or raised easily.
5. The headgear shall be of min. 1.4 mm thick good quality vulcanised fiber or acetate butyrate or equivalent material.
6. It shall be provided with adjustable type Headband made out of either Fiber or Plastic with sponge lining inside the front of the headband and covered with Rexene.
7. It shall be provided with 4mm wing nut and spring attachment for easy positioning.
8. The crown band shall be of min 25 mm width.
9. All the components of the face shield shall be comfortable to use with no sharp edges..
10. The construction shall be as per drawing enclosed.

4.0 Sample

Sample shall be supplied along with offer for approval only for first time supplier and supplies made after 3 years.

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5.0 Test certificate

5.1 The supplier shall submit the test certificate as per IS along with the bulk supply for

- a) Material quality
- b) Scratch resistance
- c) Visible transmittance
- d) Impact resistance

5.2 The test certificate shall also indicate the following.

- a) BHEL PO number
- b) Batch No. & Date

6.0 Packing

The face shield shall be supplied, packed individually for protection from damage and dust.

7.0 Marking

The face shield shall be marked with the following information

- a) BHEL logo
- b) Supplier identity
- c) Date & year of manufacturing

8.0 Inspection

Inspection will be carried out at our works with reference to the acceptable sample and test reports. BHEL will inspect at works wherever required.

9.0 Guarantee Certificate

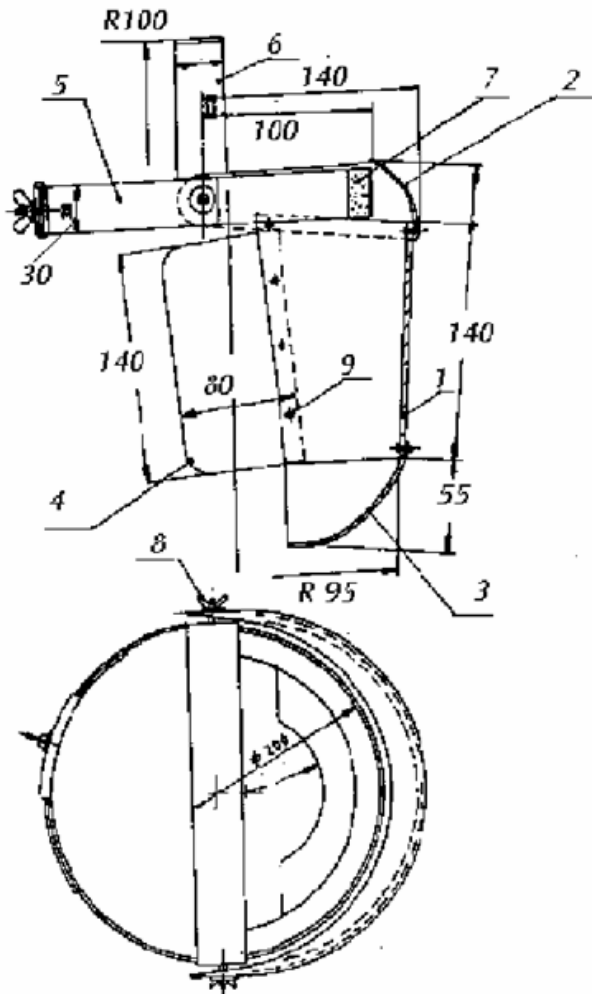
Guarantee Certificate to be given for any manufacturing defects along with its consignment for free replacement with in six months from the date of receipt at stores.

10.0 Enquiry specification

The PI and Enquiry shall have the copy of the latest specification as “Face Shield” as per BHEL Corporate standard _____”.



PLASTIC FACE SHIELD



1. Acrylic Face Plate
2. Plastic Fore Head Shield
3. Plastic Bottom Shield
4. Plastic Side Shield
5. Adjustable Head Ring
6. Head Seat
7. Fore Head Seat – foam
8. Screw with Wing nut
9. Aluminium Revets



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b) WELDING HAND SHIELD

1.0 Scope

This standard covers the requirement of welding hand shield

2.0 Compliance with Standards

It shall comply with IS 1179-1967 Reaffirmed 1997, IS – 5983-1980 Reaffirmed 1997.

3.0 Technical Requirement

1. The hand shield shall give protection during welding to the eyes, ears, face, neck and part of the head of the user against exposure to radiation, heat, sparks and splatters of hot metal.
2. The body shall be of moulded type, made out of Fiber glass / fiber sheet opaque material in black color not less than 1.5mm thick uniform smooth clear finish.
3. It shall have the window and other construction as shown in the sketch
4. It shall have the wooden / fiber handle with no sharp edges as shown in the sketch.
5. It shall be provided with 2 Nos . of plain glass size 105 x 80 x 2mm. without the mirroring effects
6. It shall be provided with 1 No. of imported filter lens size 105 x 80 x 2mm (dark Green glass) in shade No.12A conforming to DIN specification, shade engraved on it
7. The Oculars shall be free from defects like spots, holes, mould marks, scoring, scratches, bubbles, optical defects, etc.
8. It shall have a clamp to fit the lenses in the shield as shown in the sketch made of spring steel material. One spare clamp to be provided along with the shield.
9. The total weight of the Hand Shield shall not exceed 350 gms.

4.0 Sample

Sample shall be supplied along with offer for approval only for first time supplier and supplies made after 3 years.

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5.0 Test certificate

5.1 The supplier shall submit the test certificate as per IS along with the bulk supply for

- a) Material quality
- b) Welding Filter lens

5.2 The test certificate shall indicate the following.

- a) BHEL PO number
- b) Batch No. & Date

6.0 Packing

The welding shield shall be supplied, packed individually for protection from damage.

7.0 Marking

The welding shield shall be marked with the following information

- a) BHEL logo
- b) Supplier identity
- c) Date & year of manufacturing

8.0 Inspection

Inspection will be carried out at our works with reference to the acceptable sample and test reports. BHEL will inspect at works wherever required.

9.0 Guarantee Certificate

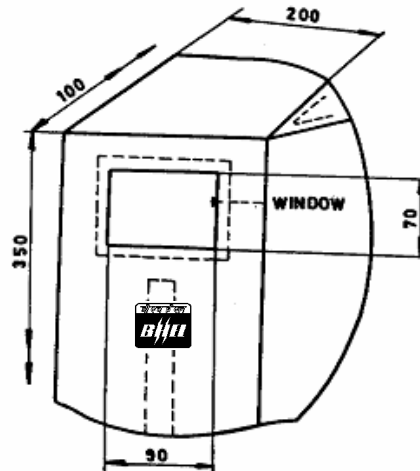
Guarantee Certificate to be given for any manufacturing defects along with its consignment for free replacement with in six months from the date of receipt at stores.

10.0 Enquiry specification

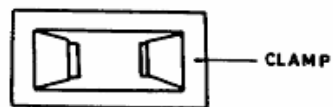
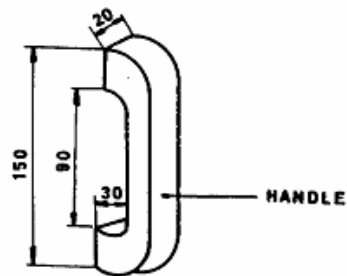
The PI and Enquiry shall have the copy of the latest specification as “Welding Hand Shield” as per BHEL Corporate standard _____”.



WELDING HAND SHIELD



All Dimensions in mm





**CORPORATE STANDARD FOR
PERSONAL PROTECTIVE EQUIPMENT**

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c) WELDING HEAD SHIELD

1.0 Scope

This standard covers the requirement of welding head shield

2.0 Compliance with Standards

It shall comply with standards IS – 1179-1967 Reaffirmed 1997, IS - 2925-1984 Reaffirmed 1995, IS – 5983-1980 Reaffirmed 1997.

3.0 Technical Requirement

1. It shall be mould out Fiber material to the thickness of 1.5mm with clear finish.
2. It shall have the window as shown in the sketch.
3. It shall have the 4mm wing Nut with spring attachment for easy positioning.
4. It shall have an adjustable Head band made of PVC provided with soft Cellulose sponge at the front side of the Head band which must be covered by Rexene cloth.
5. It shall have a provision to allow the head shield drop gradually and have stopper to arrest the fall.
6. It shall be provided with 2 Nos . of plain glass size 105 x 80 x 2mm.without the mirroring effects
7. It shall be provided with 1 No. of imported filter lens size 105 x 80 x 2mm(dark Green glass) in shade No.11A conforming to DIN specification, shade engraved on it
8. It shall have a clamp to fit the lenses in the shield as shown in the sketch made of spring steel material. One spare clamp to be provided along with the shield.
9. The Head shield shall be in Black color and the construction as per our Drawing.
10. The total weight of the Head shield shall not exceed 400 gms.

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4.0 Sample
Sample shall be supplied along with offer for approval only for first time supplier and supplies made after 3 years.

5.0 Test certificate

5.1 The supplier shall submit the test certificate as per IS along with the bulk supply for

- a) Material quality
- b) Welding Filter lens.

5.2 The test certificate shall also indicate the following

- a) BHEL PO number
- b) Batch No. & Date

6.0 Packing
The welding shield shall be supplied, packed individually for protection from damage.

7.0 Marking
The welding shield shall be marked with the following information

- a. BHEL logo
- b. Supplier identity
- c. Date & year of manufacturing

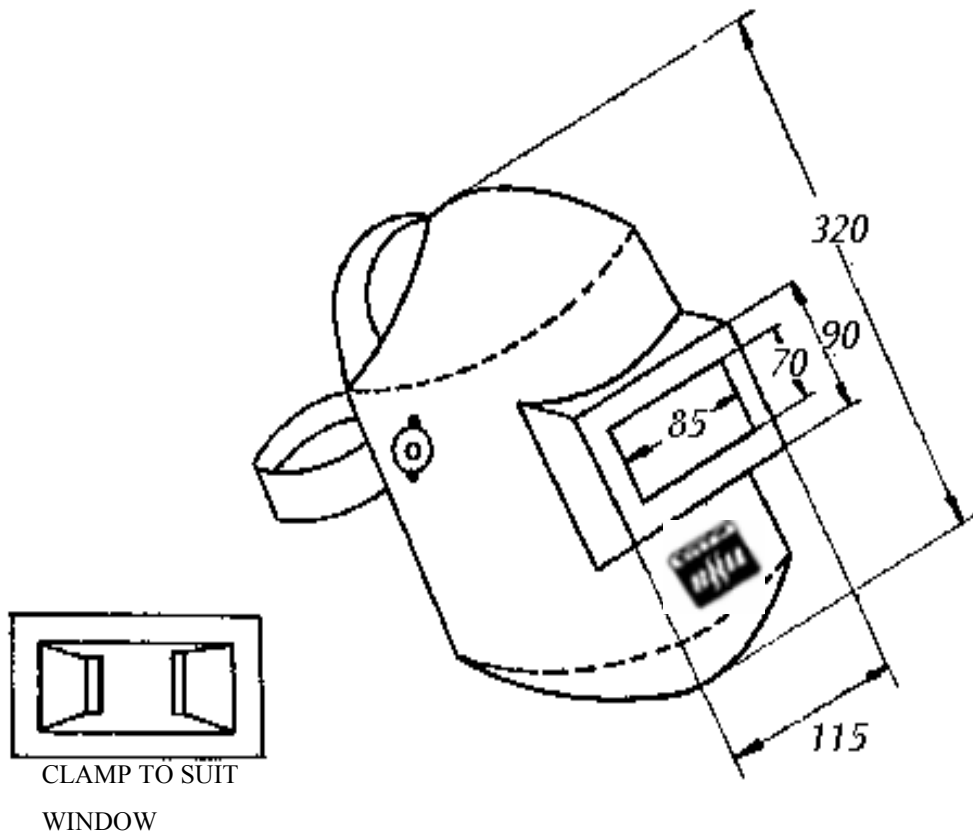
8.0 Inspection
Inspection will be carried out at our works with reference to the acceptable sample and test reports. BHEL will inspect at works wherever required.

9.0 Guarantee Certificate
Guarantee Certificate to be given for any manufacturing defects along with its consignment for free replacement with in six months from the date of receipt at stores

10.0 Enquiry specification
The PI and Enquiry shall have the latest copy of the specification as “Welding Head Shield” as per BHEL Corporate standard _____”.



WELDING HEAD SHIELD





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EAR PROTECTION**

HSE / PPE

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a) EAR MUFF

1.0 Scope

This standard covers the requirement of Ear muff.

2.0 Compliance with Standards

It shall comply with IS 9167-1979 Reaffirmed 2002 and IS 6229-1980 Reaffirmed 1995 .

3.0 Technical Requirement

1. The cup shall be made up of Polypropylene / PVC material and shall contain Polyurethane foam for attenuating the noise.
2. It shall be suitable to cover the outer ears of all users.
3. It shall be comfortable to wear.
4. It shall attenuate the noise level in the environment of 20 to 25 dB at the user.
5. The head band shall incorporate automatic head size adjustment.
6. The cups shall be provided with soft vinyl foam for effective noise sealing of the ear and provide comfort on the ear.
7. It shall not have any metal parts.

4.0 Sample

Sample shall be supplied along with offer for approval only for first time supplier and supplies made after 3 years.

5.0 Test certificate

5.1 The supplier shall submit the test certificate as per IS along with the bulk supply.

- a) Material quality
- b) Noise attenuation

5.2 The test certificate shall also indicate the following.

- a) BHEL PO number
- b) Batch No. & Date

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6.0

Packing
The ear muff shall be supplied, packed individually for protection from damage and dust.

7.0

Marking
The ear muffs shall be marked with the following information
a) BHEL logo
b) Supplier identity
c) Date & year of manufacturing

8.0

Inspection
Inspection will be carried out at our works with reference to the acceptable sample and test reports. BHEL will inspect at works wherever required.

9.0

Guarantee Certificate
Guarantee Certificate to be given for any manufacturing defects along with its consignment for free replacement with in six months from the date of receipt at stores.

10.0

Enquiry specification
The PI and Enquiry shall have the copy of the latest the specification as “Ear muff , as per BHEL Corporate standard _____”.



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b) EAR PLUGS

1.0 Scope

This standard covers the requirement of Ear Plugs

2.0 Compliance with Standards

1. It shall comply with IS 9167 –1979 Reaffirmed 2002 and IS 6229 –1980 Reaffirmed 1995

3.0 Technical Requirement

1. Ear plugs shall be made out of Polyurethane foam/ Silicon rubber.
2. It shall be of insertion type.
3. It shall be suitable to fit into the ear canal of the user to effectively attenuate noise.
4. It shall attenuate the noise level in the environment of 20-25 dB. at the user.
5. The ear plugs shall be conical in shape .
6. It shall be easy to squeeze, expand automatically to fit in to the ear.
7. Both the ear plugs shall be fastened to a nylon cord.

4.0 Sample

Sample shall be supplied along with offer for approval only for first time supplier and supplies made after 3 years

5.0 Test certificate

- 5.1 The supplier shall submit the test certificate as per IS along with the bulk supply for
 - a) Material quality
 - b) Noise attenuation
- 5.2 The test certificate shall indicate along with the bulk supply for
 - a) BHEL PO number
 - b) Batch No. & Date

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6.0

Packing
The Ear Plug shall be packed in individual Hygienic box.

7.0

Marking
The Box shall be marked with the following information
a) BHEL logo
b) Supplier identity
c) Date & year of manufacturing

8.0

Inspection
Inspection will be carried out at our works with reference to the acceptable sample and test reports. BHEL will inspect at works wherever required.

9.0

Guarantee Certificate
Guarantee Certificate to be given for any manufacturing defects along with its consignment for free replacement with in six months from the date of receipt at stores.

10.0

Enquiry specification
The PI and Enquiry shall have the copy of the latest specification as “Ear plug of Polyurethane foam / Silicon rubber as per BHEL Corporate standard _____”.



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a) PANORAMA GOGGLE

1. Scope

This standard covers the requirement of panorama goggles for use against flying particles, splashing material, molten metals and dust.

2. Compliance with Standards

It shall Comply with IS: 5983 – 1980 Reaffirmed 1997

3. Technical Requirement

1. The frame shall be made out of good quality cellulose acetate material, unbreakable and light in weight.
2. It shall have two polycarbonate oculars, non fogging, clear visors of thickness 1.0 mm to 1.5 mm.
3. The visor shall be free from optical defects like spots, holes, scoring, scratches, bubbles and mould marks.
4. It shall give protection from flying materials in to the eyes.
5. It shall have three vents on either side.
6. It shall have 15 mm wide adjustable, good quality, thick elastic headband.
7. It shall withstand elevated temperatures.

4.0 Sample

Sample shall be supplied along with offer for approval only for first time supplier and supplies made after 3 years.

5.0 Test certificate

- 5.1 The supplier shall submit the test certificate as per IS along with the bulk supply for
- a) Material quality
 - b) Optical property
 - c) Shatter proof quality

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5.2 The test certificate shall also indicate the following

- a) BHEL PO number
- b) Batch No. & Date

6.0 Packing
The goggle shall be supplied, packed individually for protection from damage & dust

7.0 Marking
The goggle shall be marked with the following information

- d) ISI/ CE mark
- e) BHEL logo
- f) Supplier identity
- g) Date & year of manufacturing

8.0 Inspection
Inspection will be carried out at our works with reference to the acceptable sample and test reports, BHEL will inspect at the works wherever required.

9.0 Guarantee Certificate
Guarantee Certificate to be given for any manufacturing defects along with its consignment for free replacement with in six months from the date of receipt at stores.

10.0 Enquiry specification
The PI and Enquiry shall have the latest copy of the specification as “Panorama goggle for flying particles” as per BHEL Corporate standard _____”.



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b) CHEMICAL PROOF PANORAMA GOGGLES

1. Scope

This standard covers the requirement of panorama goggles for use splashing chemicals.

2. Compliance with Standards

It shall Comply with IS: 5983 –1980 Reaffirmed 1997

3. Technical Requirement

1. The frame shall be made out of good quality cellulose acetate material, unbreakable and light in weight.
2. It shall have two acetate oculars, non-fogging, clear, visors, of thickness 1.0 mm to 1.5 mm.
3. The visor shall be free from optical defects like spots, holes, scoring, scratches, bubbles and mould marks.
4. It shall give protection from flying materials in to the eyes.
5. It shall have three vents on either side.
6. It shall have 15 mm wide adjustable, good quality, thick elastic head band.
7. It shall withstand elevated temperatures.

4.0 Sample

Sample shall be supplied along with offer for approval only for first time supplier and supplies made after 3 years.

5.0 Test certificate

- 5.1 The supplier shall submit the test certificate as per IS along with the bulk supply for.
- a. Material quality
 - b. Optical property
 - c. Shatter proof quality

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5.2 The test certificate shall also indicate the following

- i. BHEL PO number
- ii. Batch No. & Date

6.0 Packing
The goggle shall be supplied, packed individually for protection from dust & damage

7.0 Marking
The goggle shall be marked with the following information

- a) ISI/ CE mark
- b) BHEL logo
- c) Supplier identity
- d) Date & year of manufacturing

8.0 Inspection
Inspection will be carried out at our works with reference to the acceptable sample and test reports, BHEL will inspect at the works wherever required.

9.0 Guarantee Certificate
Guarantee Certificate to be given for any manufacturing defects along with its consignment for free replacement with in six months from the date of receipt at stores.

10.0 Enquiry specification
The PI and Enquiry shall have the latest copy the specification as “Chemical Proof Panorama goggle” as per BHEL Corporate standard _____”.



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c) SPECTACLE GOGGLES WITH GREEN LENS

1.0 Scope

This standard covers the requirement of spectacle goggles with green lenses

2.0 Compliance with Standards

It shall Comply with the following standard IS: 5983 – 1980 Reaffirmed 1997, IS: 7524 – 1980 (Part-2), Reaffirmed 1996

3.0 Technical Requirement

1. The frame shall be of good quality Cellulose Acetate material with reinforcement on the sides and opaque black in colour.
2. The glass shall be of green shade no. DIN 5 / 6 lenses, should be imported one, in the toughened quality.
3. The thickness of the lens shall be of min 2.8 mm.
4. The frame shall be of hinged type, foldable, opaque, side pieces with rivets, may be provided.
5. Good, durable, screws and Hinges on the side legs, with good workmanship must be ensured.
6. The glass shall be free from optical defects like scratches, holes, spots, etc.
7. The spectacles shall withstand elevated temperatures.

4.0 Sample

Sample shall be supplied along with offer for approval only for first time supplier and supplies made after 3 years.

5.0 Test certificate

The supplier shall submit the test certificate as per IS along with the bulk supply

- a. Material quality
- b. Optical property
- c. Shatter proof quality

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5.2 The test certificate shall also indicate the following

- a) BHEL PO number
- b) Batch No. & Date

6.0 Packing
The goggle shall be supplied, packed individually in durable Rexene pouch to prevent dust and damage.

7.0 Marking
The goggle shall be marked with the following information

- a) ISI/ CE mark
- b) BHEL logo
- c) Supplier identity
- d) Date & year of manufacturing
- e) Size of the spectacle

8.0 Inspection
Inspection will be carried out at our works with reference to the acceptable sample and test reports, BHEL will inspect at the works wherever required.

9.0 Guarantee Certificate
Guarantee Certificate to be given for any manufacturing defects along with its consignment for free replacement with in six months from the date of receipt at stores.

10.0 Enquiry specification
The PI and Enquiry shall have the latest copy of the specification as “Spectacle type Green Goggle” as per BHEL Corporate standard _____”.



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d) SPECTACLE GOGGLES WITH COBALT BLUE LENS

1.0 Scope

This standard covers the requirement of spectacle goggles with cobalt blue lenses

2.0 Compliance with Standards

It shall Comply with the following standard IS: 5983 – 1980 Reaffirmed 1997, IS: 7524 – 1980 (Part-2) Reaffirmed 1996

3.0 Technical Requirement

- a. The frame shall be of good quality Cellulose Acetate material with reinforcement on the sides and opaque black in colour.
- b. The glass shall be of Cobalt Blue lenses, should be imported ones, in the toughened quality.
- c. The thickness of the lens shall be of min 2.8 mm.
- d. The frame shall be of hinged type, foldable, opaque, side pieces with rivets, may be provided.
- e. Good, durable, screws and Hinges on the side legs, with good workmanship must be ensured.
- f. The glass shall be free from optical defects like scratches, holes, spots, etc.
- g. The spectacles shall withstand elevated temperatures.

4.0 Sample

Sample shall be supplied along with offer for approval only for first time supplier and supplies made after 3 years.

5.0 Test certificate

The supplier shall submit the test certificate as per IS along with the bulk supply for

- a) Material quality
- b) Optical property
- c) Shatter proof quality

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5.2 The test certificate shall also indicate the following

- a. BHEL PO number
- b. Batch No. & date

6.0 Packing
The goggle shall be supplied, packed individually in durable Rexene pouch to prevent dust and damage.

7.0 Marking
The goggle shall be marked with the following information

- a) ISI/ CE mark
- b) BHEL logo
- c) Supplier identity
- d) Date & year of manufacturing
- e) Size of the spectacle

8.0 Inspection
Inspection will be carried out at our works with reference to the acceptable sample and test reports, BHEL will inspect at the works wherever required.

9.0 Guarantee Certificate
Guarantee Certificate to be given for any manufacturing defects along with its consignment for free replacement with in six months from the date of receipt at stores.

10.0 Enquiry specification
The PI and Enquiry shall have latest copy of the specification as “Spectacle type Green Goggle” as per BHEL Corporate standard _____”.



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e) WELDING FILTER LENS SHADE : 5, 6, 11, 12, 13, & 14

1.0 Scope

This standard covers the requirement of filter lens welding application

2.0 Compliance with Standards

It shall comply with the following Standards IS : 5983 – 1980 Reaffirmed 1997

3.0 Technical Requirement

1. The Lens shall be made wholly of Glass free from optical defects
2. It shall have the Optical properties, as per the IS.
3. It shall not differ the percent Transmission of Visible light in any other portion more than 10 % of the Transmission in the Central area as per IS.
4. It shall be of size 105mm x 80mm x 2mm for shades 6 and 11-14 suitable to fit in the welding shield and size 50mm dia 2mm thick for the shades 5 and 6. Suitable for gas cutting goggles
5. The filter lenses shall be imported one with clear marking of DIN and shade number engraved on it.

4.0 Sample

Sample shall be supplied along with offer for approval only for first time supplier and supplies made after 3 years.

5.0 Test certificate

- 5.1 The supplier shall submit the test certificate along with the bulk supply for
 - a) Optical property
 - b) Filtering efficiency
- 5.2 The test certificate shall also indicate the following
 - c) BHEL PO number
 - d) Batch No. & Date

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6.0 Packing
The filter lens shall be supplied with good quality box for protection from damage.

7.0 Marking
The Filter lens shall be marked with the following information

- i. Shade number as per Din standard
- ii. Date & year of manufacturing

8.0 Inspection
Inspection will be carried out at our works with reference to the acceptable sample and test reports, BHEL will inspect at the works wherever required.

9.0 Guarantee Certificate
Guarantee Certificate to be given for any manufacturing defects along with its consignment for free replacement with in six months from the date of receipt at stores

10.0 Enquiry specification
The PI and Enquiry shall have latest copy of the specification as “Welding Filter lens” as per BHEL Corporate standard _____”.



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f) GAS WELDING GOGGLES FLIP UP TYPE

1.0 Scope

This standard covers the requirement of Gas welding / cutting goggles (flip up type)

2.0 Compliance with Standards

It shall comply with IS 1179 – 1967, Reaffirmed 1997

3.0 Technical Requirement

1. The frame shall be of good quality cellulose acetate material.
2. It shall have smooth finish, suitable to wear over the powered spectacles.
3. It shall have a pair of flip-up type cups with screw cap arrangement to hold the filter lenses.
4. It shall have two pairs of clear glass of size 50mm dia as protective cover to filter lens.
5. It shall have a pair of filter lenses, of size 50mm dia, shade No.6, conforming to DIN specification. Shade no shall be engraved on the glass.
6. The frame shall have vents on either side for allowing adequate ventilation, but preventing light and dust.
7. It shall have a good quality elastic headband of min 15mm width with adjustable arrangement.

4.0 Sample

Sample shall be supplied along with offer for approval only for first time supplier and supplies made after 3 years.

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5.0 Test certificate

5.1 The supplier shall submit the test certificate along with the bulk supply for

- a) Material Quality
- b) Filtering Efficiency
- c) Optical properties

5.2 The test certificate shall also indicate the following

- a) BHEL PO number
- b) Batch No. & Date

6.0 Packing

The goggle shall be packed in individual durable Rexene pouch to prevent dust and damage.

7.0 Marking

The goggle shall be marked with the following information

- a) ISI/ CE mark
- b) BHEL logo
- c) Supplier identity
- d) Date & year of manufacturing

8.0 Inspection

Inspection will be carried out at our works with reference to the acceptable sample and test reports, BHEL will inspect at the works wherever required.

9.0 Guarantee Certificate

Guarantee Certificate to be given for any manufacturing defects along with its consignment for free replacement with in six months from the date of receipt at stores.

10.0 Enquiry specification

The PI and Enquiry shall have the latest copy of the specification as “Flip up type Gas cutting / Welding Goggle” as per BHEL Corporate standard _____”.



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g) LEATHER MASK GOGGLES

1.0 Scope

This standard covers the requirement of Leather mask goggle for use against flying particles, splashing material, molten metals and dust.

2.0 Compliance with Standards

It shall Comply with the following standard IS: 5983 – 1980 Reaffirmed 1997, IS: 7524 – 1980 (Part-2), Reaffirmed 1997.

3.0 Technical Requirement

1. They shall be made out of good quality Cow Grain Leather.
2. They shall have a pair of Aluminum cups with Screw arrangement.
3. They shall have a pair of Laminated Non – shatter able Lenses in size 50mm dia to the thickness not more than 4mm.
4. They shall have sweat – proof lining along with the edges.
5. They shall have two specially designed Vents on either side providing adequate ventilation and preventing entry of light and dust.
6. They shall have a pair of spring type Elastic Band with adjustable leather strap.

4.0 Sample

Sample shall be supplied along with offer for approval only for first time supplier and supplies made after 3 years.

5.0 Test certificate

- 5.1 The supplier shall submit the test certificate as per IS along with the bulk supply for.
 - a) Material quality
 - b) Optical property
 - c) Shatter proof quality
- 5.2 The test certificate shall also indicate the following
 - a) BHEL PO number
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6.0

Packing
The goggle shall be supplied, packed individually in polythene cover for protection from dust and damage.

7.0

Marking
The goggle shall be marked with the following information
a) ISI/ CE mark
b) BHEL logo
c) Supplier identity
d) Date & year of manufacturing

8.0

Inspection
Inspection will be carried out at our works with reference to the acceptable sample and test reports, BHEL will inspect at the works wherever required.

9.0

Guarantee Certificate
Guarantee Certificate to be given for any manufacturing defects along with its consignment for free replacement with in six months from the date of receipt at stores.

10.0

Enquiry specification
The PI and Enquiry shall Have the latest copy of the specification as “Leather mask goggle for flying particles” as per BHEL Corporate standard _____”.



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h) PLAIN GLASS FOR ARC WELDING

1.0 Scope

This standard covers the requirement of plain glass protective cover for arc welding

2.0 Compliance with Standards

It shall comply with the standards IS : 5983 – 1980 Reaffirmed 1997

3.0 Technical Requirement

1. It shall be made of clear glass, and shall be free from optical defects, lens or prism defects and shall be of uniform surface.
2. It shall have transmission to visible light not less than 85%
3. The thickness shall be $2.0 + 0.5/-0$ mm
4. The size shall be $105 \times 80 +4/-0$ mm.

4.0 Sample

Sample shall be supplied along with offer for approval only for first time supplier and supplies made after 3 years.

5.0 Test certificate

5.1 The supplier shall submit the test certificate as per IS along with the bulk supply.

- a) Material quality
- b) Optical property
- c) Shatter proof quality

5.2 The test certificate shall also indicate the following

- 1) BHEL PO number
- 2) Batch No. & Date

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6.0

Packing
The glass shall be supplied with good quality box for protection from damage.

7.0

Marking

8.0

Inspection
Inspection will be carried out at our works with reference to the acceptable sample and test reports, BHEL will inspect at the works wherever required.

9.0

Guarantee Certificate
Guarantee Certificate to be given for any manufacturing defects along with its consignment for free replacement with in six months from the date of receipt at stores

10.0

Enquiry specification
The PI and Enquiry shall have the latest copy of the specification as “Plain glass” as per BHEL Corporate standard _____”.



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i) PLAIN GLASS FOR GAS WELDING GOGGLES

1.0 Scope

This standard covers the requirement of Plain Glass Protective Cover For Gas Welding Goggles

2.0 Compliance with Standards

It shall comply with the standard IS: 5983 – 1980 Reaffirmed 1997

3.0 Technical Requirement

1. It shall be made of glass, and shall be free from Optical defects, Lens or prism defects and shall be of uniform surface.
2. It shall have transmission to visible light not less than 85%
3. The size shall be of 50mm dia and thickness of 2 .0 +0.5/-0.0 mm
4. It shall be suitable to be fitted on conventional type gas cutting/ welding goggles.

4.0 Sample

Sample shall be supplied along with offer for approval only for first time supplier and supplies made after 3 years.

5.0 Test certificate

5.1 The supplier shall submit the test certificate as per IS along with the bulk supply

- a) Material quality
- b) Optical property
- c) Shatter proof quality

5.2 The test certificate shall also indicate the following

- a) BHEL PO number
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6.0

Packing

The glass shall be supplied with good quality box to prevent damage

7.0

Marking

8.0

Inspection

Inspection will be carried out at our works with reference to the acceptable sample and test reports, BHEL will inspect at the works wherever required.

9.0

Guarantee Certificate

Guarantee Certificate to be given for any manufacturing defects along with its consignment for free replacement with in six months from the date of receipt at stores.

10.0

Enquiry specification

The PI and Enquiry shall have the latest copy of the specification as “Plain Glass For Gas Welding Goggles” as per BHEL Corporate standard _____”.



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j) SPECTACLE TYPE SAFETY GOGGLES

1.0 Scope

This standard covers the requirement of Spectacle Type Safety Goggles

2.0 Compliance with Standards

It shall comply with IS : 5983 – 1980 reaffirmed 1997, IS: 7524 (Part I) – 1980, Reaffirmed 1997

3.0 Technical Requirement

1. The frame should be of good quality cellulose Acetate material with reinforcement on the sides and opaque Black / Brown in colour.
2. It shall have toughened imported lens (English, White Toric, plain, Optically Neutral) and should withstand the steel- ball impact test
3. The thickness of the lens shall be of min 2.8 mm.
4. The frame shall be of hinged type and have foldable, Wire mesh side pieces with good rivets.
5. Good, durable, Screws and Hinges on the side legs with good workmanship must be ensured.
6. There should not be any defect either in the frame, or in the Lens, and the Goggles should be of smooth and fine surface quality.

4.0 Sample

Sample shall be supplied along with offer for approval only for first time supplier and supplies made after 3 years.

5.0 Test certificate

5.1 The supplier shall submit the test certificate as per IS along with the bulk supply

- a) Material quality
- b) Optical property
- c) Shatter proof quality

5.2 The test certificate shall also indicate the following

- 1) BHEL PO number
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6.0 Packing
The goggle shall be supplied with individual good quality durable Rexene pouch for protection from damage and dust.

7.0 Marking
The goggle shall be marked with the following information

- a) ISI/ CE mark
- b) BHEL logo
- c) Supplier identity
- d) Date & year of manufacturing

8.0 Inspection
Inspection will be carried out at our works with reference to the acceptable sample and test reports, BHEL will inspect at the works wherever required.

9.0 Guarantee Certificate
Guarantee Certificate to be given for any manufacturing defects along with its consignment for free replacement with in six months from the date of receipt at stores.

10.0 Enquiry specification
The PI and Enquiry shall have the latest copy of the specification as “Spectacle type Goggle” as per BHEL Corporate standard _____”.



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BODY PROTECTION**

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a) ALUMINISED SUIT

1.0 Scope

This standard covers the requirement of Aluminised Suit

2.0 Compliance with Standards

1. It shall comply with the standards
2. Kevlar thread to be used as per relevant standard

3.0 Technical Requirement

3.1 The size shall be as per drawing at page 3/3

3.2 ALUMINISED GLOVES

1. It shall be made up of good quality Aluminised cloth.
2. It shall be of five finger type.
3. It shall withstand the radiant heat around 600 deg. C

3.3. ALUMINISED JERKIN

1. It shall be made up of good quality Aluminised cloth.
2. It shall be provided with thick wool & cotton lining
3. It shall withstand the radiant heat around 600 deg .
4. It shall have open brass zip arrangement in the front for full length and shall be covered with aluminised flap.

3.4 ALUMINISED PANT

1. It shall be made of Aluminised cloth.
2. It shall be provided with thick wool not less than 3mm thick & cotton lining.
3. It shall withstand the radiant heat around 600 deg. C.
4. It shall have a loop arrangement of 50 mm size to fix the belt at the waist.
5. A separate belt shall be provided in proportion to the loop size.
6. It shall have a adjustable shoulder strap.

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3.4. ALUMINISED BOOT

1. The boot shall be made up of good quality aluminised material.
2. It shall be provided with metal toe conforming to IS
3. It shall be provided good quality fire resistance bottom sole of nit rile rubber.
4. The bottom shall withstand the temperature around with 600 deg. C.
5. The size of the shoe shall be as given in Drawing

3.5. ALUMINISED HOOD

1. The hood shall be made up of good quality aluminised material.
2. It shall be provided with a round brim helmet with nape strap arrangement
3. It shall have a window arrangement of size 150x100mm
4. Suitable visor shall be provided in the window to give clear vision and protection to the eyes.

4.0 Sample

Catalogue with material specification and drawing shall be submitted along with offer for approval. Pilot sample to be submitted before effecting bulk supply.

5.0 Test certificate

5.1 The supplier shall submit the test certificate along with the bulk supply for

- a) Quality of aluminised cloth.
- b) Physical and chemical properties

5.2 The test certificate shall also indicate the following

- a) BHEL PO number
- b) Batch No. & Date

6.0 Packing

The suit shall be packed in individual polythene bags to prevent dust and supplied in a reusable suitable suit case/ box.

7.0 Marking

The Suit shall be marked with the following information

1. BHEL logo
2. Supplier identity
3. Date & year of manufacturing

8.0 Inspection

Inspection will be carried out at our works with reference to the acceptable sample and test reports, BHEL will inspect at the works wherever required.

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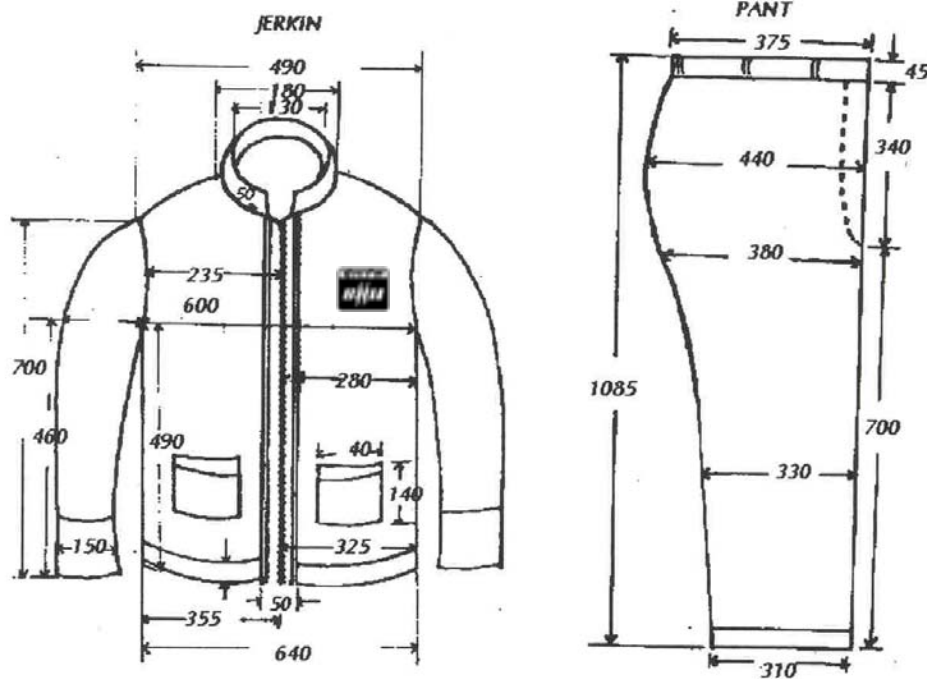


9.0 Guarantee Certificate

Guarantee Certificate to be given for any manufacturing defects along with its consignment for free replacement within six months from the date of receipt at stores.

10.0 Enquiry specification

The PI and Enquiry shall have the latest copy of the specification as "Aluminised suit of size Small / Medium / Large and shoe size _____, as per BHEL Corporate standard _____".





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b) MULTI LAYER FIRE PROXIMITY SUIT

1.0 Scope

This standard covers the requirement of Fire Proximity Suit

2.0 Compliance with Standards

1. It shall comply with the standards
2. Kevlar thread to be used as per relevant standard

3.0 Technical Requirement

The suit shall two piece construction (Pant and Jerkin) supplied with a helmet, Anti-flash Hood, gloves and a pair of knee boot to suitable with stand radiant 600° C have the Material Combination for suit as:

Outer Shell : Fabric made from Pre - oxidised fibre blended with high strength fibre rip-stop construction.

Moisture barrier : Made from inherently flame retardant fabric .

Thermal liner: Made from inherently flame retardant fabric corded lane construction.

3.1 Jerkin:

1. Fire proximity Jerkin is to be provided with FR Zipper and FR Velcro (Hook & Loop)
2. The Zipper is to be Concealed by a flap of the outer shell with Velcro provision for extra protection
3. Special features to be provided under the armpits for easy movement of arms
4. FR Knitted material to be provided at the wrist for firm fit and to ensure that heat is not transmitted through the wrists
5. 2" FR Reflective trim to be used at bottom round, middle round and arms round to ensure high visibility
6. Two pockets with flaps at the bottom half on both sides to be provided.
7. The entire Jacket is to be stitched with FR Threads
8. The Jacket is to be supplied IS/CE Certified meeting the requirements of IS/ EN standard.
9. The size shall be extra large suitable for all men

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3.2. Pant:

1. Fire proximity Pant is to be Provided with Two Zippers on the sides for easy wear and removal with comfort while wearing or removing
2. The FR Velcro to be provided to ensures that the zippers are concealed with flaps and held in place at the waist
3. FR Elastic is to be provided at the waist for firm fit
4. Two side pockets are to be provided for storing any important accessories
5. The entire pant is to be held in place by adjustable FR Suspenders
6. An additional layer of outer shell FR and Antistatic fabric at the knee portion for additional reinforcement to enhance the life of the garment during kneeling or any such operation.
7. A pocket at the side thigh portion is to be provided for holding a any other tools
8. 2"FR Reflective trim to be provided at the ankle portion for high visibility
9. The Pant is to be IS/CE Certified meeting the requirements of IS/EN standard
10. The size shall be extra large suitable for all men

3.3. Hood:

1. The hood shall be made up of good quality fame retardant material.
2. It shall be provided with a round brim helmet with nape strap arrangement
3. Suitable visor shall be provided to give protection to the eyes from infra red/ultraviolet and heat radiation
4. It shall have an Anti-flash Hood made from inherently flame retardant knitted fabric.
5. The hood shall be meeting the requirement of IS/EN standard

3.4 Boot:

1. The boot shall be made up of good quality rubber material.
2. It shall be provided with ISI/EN metal toe
3. It shall be provided good quality fire resistance bottom sole.
4. The bottom shall withstand the temperature around with 600 ° C
5. Size shall be standard size 8.
6. The boot shall be meeting the requirement of IS/EN standard

3.5 Gloves:

1. They shall be made up of good quality Multi layer inherent fire retardant fabric and leather at the palm portion.
2. They shall be of five finger type with double padding with suitable material at the palm to with stand the heat around 600 ° C
3. It shall be flexible and comfortable to user.

4.0 Sample

Sample shall be supplied along with offer for approval only for first time supplier and supplies made after 3 years.

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5.0

Test certificate

5.1

The supplier shall submit the test certificate along with the bulk supply for

a) Quality of Flame retardant cloth.

b) Physical and chemical properties

5.2

The test certificate shall also indicate the following

a) BHEL PO number

b) Batch No. & Date

6.0

Packing

The suit shall be packed in individual polythene bags to prevent dust and supplied in a reusable suitable suit case/ box.

7.0

Marking

The Suit shall be marked with the following information

a) ISI/CE mark

b) BHEL logo

c) Supplier identity

d) Date & year of manufacturing

8.0

Inspection

Inspection will be carried out at our works with reference to the acceptable sample and test reports, BHEL will inspect at the works wherever required.

9.0

Guarantee Certificate

Guarantee Certificate to be given for any manufacturing defects along with its consignment for free replacement with in six months from the date of receipt at stores.

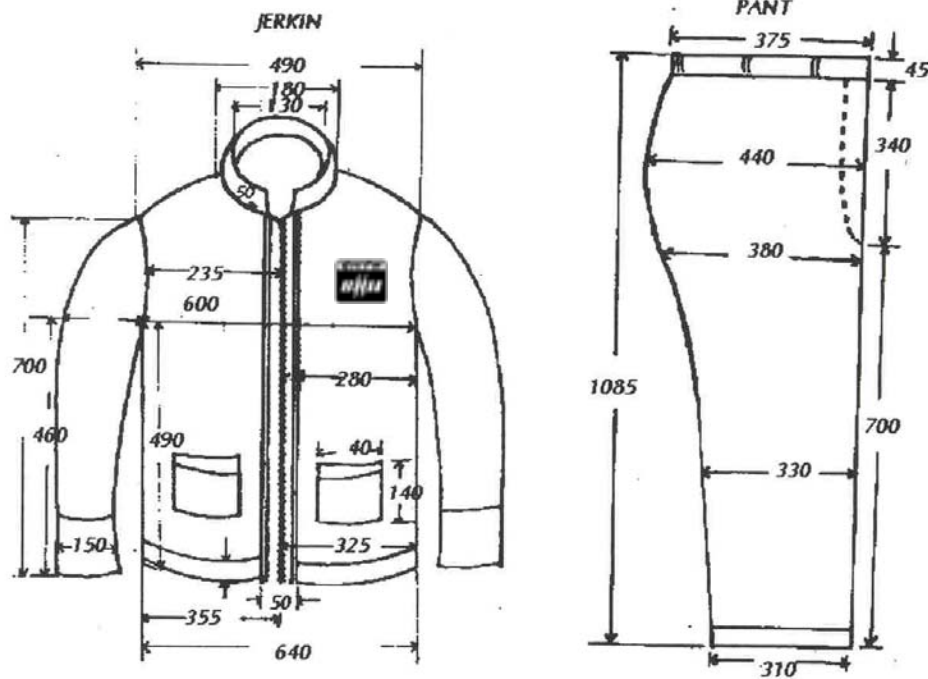
10.0

Enquiry specification

The PI and Enquiry shall have the latest copy of the specification as “Fire Proximity suit of size Small / Medium / Large and shoe size _____ , as per BHEL Corporate standard _____”.



MULTI LAYER FIRE PROXIMITY SUIT





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c) KEVLAR APRON WITH LEATHER LINING

1.0 General

This standard covers the requirement of Kevlar Apron with Leather lining

2.0 Compliance with Standards

Leather lining shall conform to IS: 6153-1971 Amendment 01 1998

3.0 Technical Requirement

1. It shall be made of Kevlar cloth.
2. The Kevlar cloth shall be uniform in texture.
3. It shall be provided with inside Leather Lining.
4. The leather used for the apron shall be uniform in texture. It shall be resilient and pliable.
5. The thickness of the asbestos shall be of min.2.0 mm thick and that of the lining leather shall be of min 1.5 mm thick.
6. It shall give protection against radiant heat of around 600 deg. C
7. It shall have two straps and buckles with adjuster for fastening. One at the Back level and one at the Waist level.
8. The buckles shall be Nickel plated/ powder coated.
9. The size of the apron shall be as given below and as per drawing

Sl. No	Length	Width
1	900	600
2	990	660
3	1070	760

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4.0 Sample
Sample shall be supplied along with offer for approval only for first time supplier and supplies made after 3 years.

5.0 Test certificate

5.1 The supplier shall submit the test certificate along with the bulk supply for

- a) Leather quality
- b) Physical and chemical properties of leather as per IS.

5.2 The test certificate shall also indicate the following

- a) BHEL PO number
- b) Batch No. & Date

6.0 Packing
The apron shall be dusted with Talcum powder and packed in individual polythene bag to prevent dust.

7.0 Marking
The apron shall be marked with the following information

- a) BHEL logo
- b) Supplier identity
- c) Date & year of manufacturing

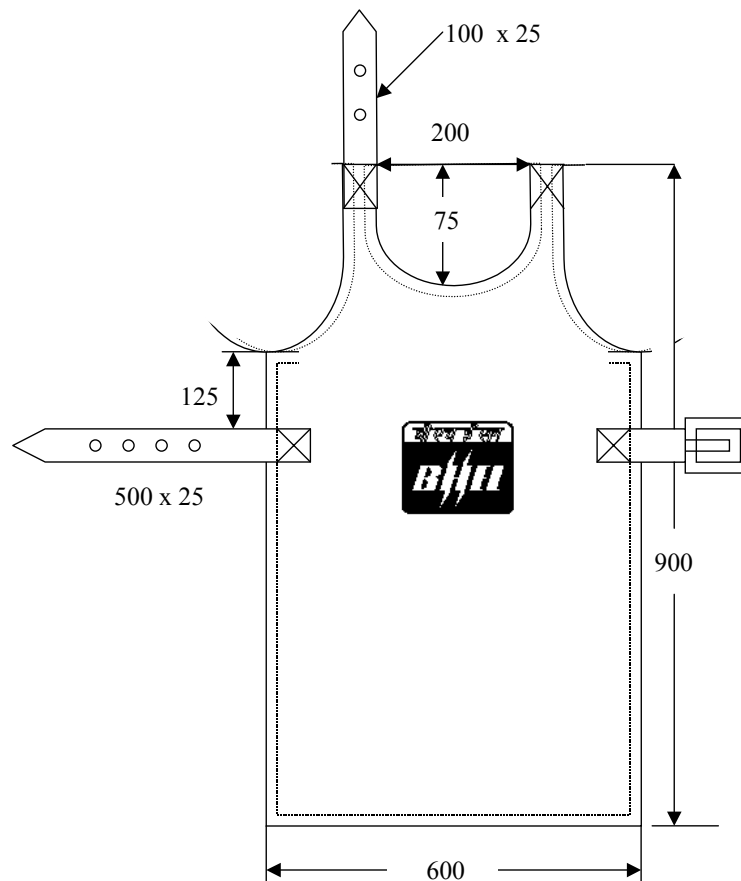
8.0 Inspection
Inspection will be carried out at our works with reference to the acceptable sample and test reports, BHEL will inspect at the works wherever required.

9.0 Guarantee Certificate
Guarantee Certificate to be given for any manufacturing defects along with its consignment for free replacement with in six months from the date of receipt at stores.

10.0 Enquiry specification
The PI and Enquiry shall have the latest copy of the specification as “Asbestos apron of size _____ as per BHEL Corporate standard _____.”



KEVLAR APRON WITH LEATHER LINING





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d) LEATHER APRON

1.0 Scope

This standard covers the requirement of Leather Apron.

2.0 Compliance with Standards

It shall comply with IS: 6153 – 1971 Amendment 01 1998

3.0 Technical Requirement

1. It shall be made up of chrome tanned cow grain leather.
2. The leather used for the apron shall be smooth, uniform in texture. It shall be resilient and pliable, free from cuts, holes and loose flashes.
3. The outer surface of apron shall be of full grain and smooth finished and shall have uniform thickness of 1.5mm.
4. The apron shall be in one piece and no joints are allowed.
5. It shall give protection from radiant splashing of hot object like welding slag, grinding chips etc.
6. It shall have Straps and Buckles with adjuster for fastening. One at the back level and another one at the waist level.
7. The buckles shall be Nickel plated/ powder coated.
8. The size of the apron shall be as below of type 3A (Full skirt type) of above mentioned IS.

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Sl. No	Length	Width
1	900	600
2	990	660
3	1070	760

4.0 Sample
Sample shall be supplied along with offer for approval only for first time supplier and supplies made after 3 years.

5.0 Test certificate

5.1 The supplier shall submit the test certificate along with the bulk supply for

- Leather quality
- Physical and chemical properties as per IS referred

5.2 The test certificate shall also indicate the following

- BHEL PO number
- Batch No. & Date

6.0 Packing
The apron shall be packed individually for protection from dust and damage.

7.0 Marking
The apron shall be marked with the following information

- BHEL logo
- Supplier identity
- Date & year of manufacturing

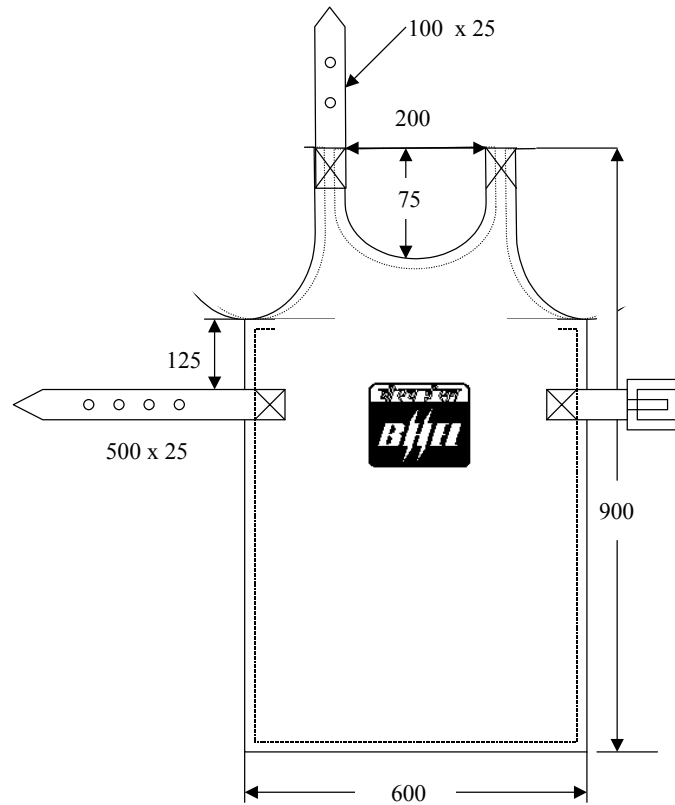
8.0 Inspection
Inspection will be carried out at our works with reference to the acceptable sample and test reports, BHEL will inspect at the works wherever required.

9.0 Guarantee Certificate
Guarantee Certificate to be given for any manufacturing defects along with its consignment for free replacement with in six months from the date of receipt at stores.

10.0 Enquiry specification
The PI and Enquiry shall have the latest copy of the specification as “Leather apron of size _____ as per BHEL Corporate HSE standard _____”.



LEATHER APRON





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e) PVC APRON

1.0 General

This standard covers the requirement of PVC Apron

2.0 Compliance with Standards

It shall comply with relevant standards

3.0 Technical Requirement

1. It shall be made of Acid and Alkali proof PVC material, uniform in thickness of min 1 mm, free from pin holes, air bubbles.
2. It shall be of oil resistant yellow in colour.
3. It shall give protection against acid, alkali, oil, water etc.
4. It shall have two straps and buckles with adjuster for fastening. One at the Neck level and one at the Waist level.
5. The buckles shall be Nickel plated/ powder coated.
6. The size of the apron shall be as per drawing at page 3/3

Sl. No	Length	Width
1	900	600
2	990	660
3	1070	760

4.0 Sample

Sample shall be supplied along with offer for approval only for first time supplier and supplies made after 3 years.

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5.0

Test certificate

5.1

The supplier shall submit the test certificate along with the bulk supply for

- b) Material quality
- c) Physical properties
- d) Chemical properties

5.2

The test certificate shall also indicate the following

- a) BHEL PO number
- b) Batch No. & Date

6.0

Packing

The apron shall be dusted with Talcum powder and packed in individually for protection from dust and damage.

7.0

Marking

The apron shall be marked with the following information

- a) BHEL logo
- b) Supplier identity
- c) Date & year of manufacturing

8.0

Inspection

Inspection will be carried out at our works with reference to the acceptable sample and test reports, BHEL will inspect at the works wherever required.

9.0

Guarantee Certificate

Guarantee Certificate to be given for any manufacturing defects along with its consignment for free replacement with in six months from the date of receipt at stores.

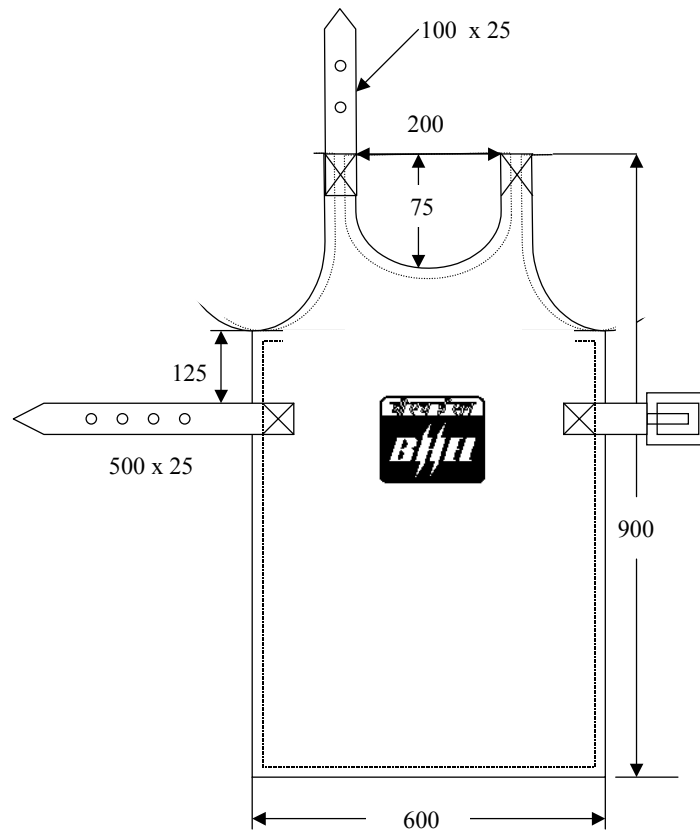
10.0

Enquiry specification

The PI and Enquiry shall have the latest copy of the specification as “PVC apron of size _____ as per BHEL HSE Corporate standard _____.



PVC APRON





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f) SAFETY BELT

1.0 Scope

This standard covers the requirement of Safety Belt

2.0 Compliance with Standards

It shall comply with IS 3521-1999.

3.0 Technical Requirement

1. It shall be of Class “A” type (Fall Arresting) of the IS referred above.
2. It shall consist of fully adjustable waist belt, shoulder belt, thigh belt, lanyard and anchoring components.
3. The shoulder and waist belt shall be made out of Nylon / polyester / synthetic Webbing of width of 40.0 mm and 3.0 mm thick provided with permanent ISI marking.
4. It shall be provided with Friction adjuster, Buckles for fastening and Semi triangular Block ring.
5. The lanyard shall be of 10mm dia., 3.0 mtrs. length of Nylon / Polyester / Polypropylene .
6. One end of the rope shall be directly spliced and the other end shall be thimbled and spliced to a hook.
7. The buckles and adjusters shall be Nickel plated and the hook galvanized.
8. The joints are to be machine stitched in addition suitably riveted with copper rivets.
9. The construction of the belt shall be as per IS.

4.0 Sample

Sample shall be supplied along with offer for approval only for first time supplier and supplies made after 3 years.

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5.0 Test certificate

5.1 The supplier shall submit the test certificate along with the bulk supply for

- a) Material quality
- b) Physical and chemical properties as per IS
- c) Static and Dynamic Load test as per IS.

5.2 The test certificate shall also indicate the following

- a) BHEL PO number
- b) Batch No. & Date

6.0 Packing

The safety belt shall be supplied packed individually in polythene bag to prevent dust and damage.

7.0 Marking

- a) The Safety belt shall be marked with the following information
- b) BHEL logo
- c) Supplier identity
- d) Date & year of manufacturing

8.0 Inspection

Inspection will be carried out at our works with reference to the acceptable sample and test reports, BHEL will inspect at the works wherever required.

9.0 Guarantee Certificate

Guarantee Certificate to be given for any manufacturing defects along with its consignment for free replacement with in six months from the date of receipt at stores.

10.0 Enquiry specification

The PI and Enquiry shall have the copy of the specification as “Fall arresting Safety Belt of Class “A” with or with out optional class of IS. and as per BHEL HSE Corporate standard _____.



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g) LEATHER PANT & JERKIN

1.0 Scope

This standard covers the requirement of Leather Pant and Jerkin

2.0 Compliance with Standards

It shall conform to IS: 6153-1971 Amendment 01.1998

3.0 Technical Requirement

3.1 Leather Jerkin

2. It shall be made out of Chrome tanned Cow Grain Leather.
3. The leather used shall be uniform in texture, resilient and pliable.
4. The outer surface of shall be of full grain and smooth finished. The jerkin shall have uniform thickness of min 1.5 mm thick.
5. It shall have inside cotton lining.
6. It shall have open zip arrangements in the front for the full length.

3.2 Leather Pant

1. It shall be made out of Chrome tanned Cow Grain Leather.
2. The leather used for the apron shall be uniform in texture it shall be resilient and pliable.
3. The outer surface of pant shall be of full grain and smooth finished. The pant shall have uniform thickness of min 1.5 mm thick.
4. It shall have inside cotton lining.
5. It shall have loop arrangements of size 50mm to fix the Belt at the waist.
6. A separate Belt shall be provided in proportion to the loop size.
7. It shall have a adjustable shoulder strap arrangement.

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4.0 Sample
Sample shall be supplied along with offer for approval only for first time supplier and supplies made after 3 years.

5.0 Test certificate

5.1 The supplier shall submit the test certificate along with the bulk supply for

- a) Leather quality
- b) Physical and chemical properties as per IS.

5.2 The test certificate shall also indicate the following

- a) BHEL PO number
- b) Batch No. & Date

6.0 Packing
The suit shall be packed in individual polythene bag to prevent dust.

7.0 Marking

- a) The suit shall be marked with the following information
- b) BHEL logo
- c) Supplier identity
- d) Date & year of manufacturing

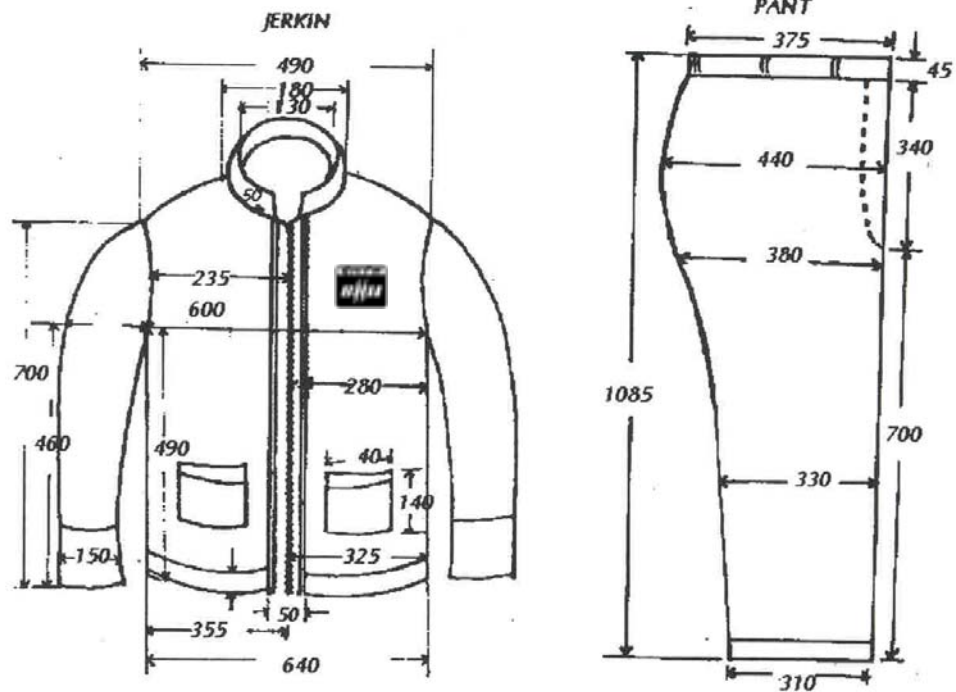
8.0 Inspection
Inspection will be carried out at our works with reference to the acceptable sample and test reports, BHEL will inspect at the works wherever required.

9.0 Guarantee Certificate
Guarantee Certificate to be given for any manufacturing defects along with its consignment for free replacement with in six months from the date of receipt at stores.

10.0 Enquiry specification
The PI and Enquiry shall have the latest copy of the specification as “Leather Pant and Jerkin of size Small / Medium / Large as per BHEL Corporate standard _____”.



LEATHER PANT & JERKIN





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h) COTTON COVERALL

1.0 Scope

This standard covers the requirement of General purpose Cotton Coverall

2.0 Compliance with Standards

1.It shall comply with the standards

3.0 Technical Requirement

1. The Coverall shall be of single piece construction
2. It shall be made up of breathable cotton drill fabric suitable for industrial operation
3. It shall be stitched with cotton sewing thread as per IS
4. It shall have side pockets and top pocket
5. It shall have heavy duty zipper for front opening
6. It shall have press button at cutoff
7. It shall have Velcro for flap closure
8. Size shall be suitable for all workmen

4.0 Sample

Sample shall be supplied along with offer for approval only for first time supplier and supplies made after 3 years.

5.0 Test certificate

5.1 The supplier shall submit the test certificate along with the bulk supply for

- a) Quality of fabric
- b) Physical and chemical properties

5.2 The test certificate shall also indicate the following

- a) BHEL PO number
- b) Batch No. & Date

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6.0

Packing
The coverall shall be supplied, packed individually in polythene bags to prevent dust and damage

7.0

Marking

The Suit shall be marked with the following information

- a) ISI/CE mark
- b) BHEL logo
- c) Supplier identity
- d) Date & year of manufacturing

8.0

Inspection
Inspection will be carried out at our works with reference to the acceptable sample and test reports, BHEL will inspect at the works wherever required.

9.0

Guarantee Certificate
Guarantee Certificate to be given for any manufacturing defects along with its consignment for free replacement with in six months from the date of receipt at stores..

10.0

Enquiry specification
The PI and Enquiry shall have the latest copy of the specification as “Cotton Coverall” size Small / Medium / Large and shoe size _____ , as per BHEL Corporate standard _____”.



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i) SAFETY BELT FOR POLE WORK

1.0 Scope

This standard covers the requirement of Safety Belt for work positioning

2.0 Compliance with Standards

It shall comply with IS 3521-1999.

3.0 Technical Requirement

1. It shall be of Class “P” type (Work Positioning) of the IS referred above.
2. It shall consist of fully adjustable waist belt, shoulder belt, thigh belt, lanyard and anchoring components.
3. The shoulder and waist belt shall be made out of Nylon / polyester / synthetic Webbing of width of 40.0 mm and 3.0 mm thick provided with permanent ISI marking.
4. It shall be provided with Friction adjuster, Buckles for fastening and Semi triangular Block ring.
5. It shall be provided with narrow back comfort pad with two side D rings.
6. The lanyard shall be of 12mm dia., 3.0 mtrs. length of Nylon / Polyester / Polypropylene .
7. One end of the rope shall be directly spliced and the other end shall be thimble and spliced to a hook
8. D ring shall be mounted at the waist level. The lanyard shall be of 12mm dia., maximum length adjustment of 2.0 mtrs. Nylon / Polyester / Polypropylene with automatic grip adjuster to be provided
9. The buckles and adjusters shall be Nickel plated and the hook galvanized.
10. The joints are to be machine stitched in addition suitably riveted with copper rivets.
11. The construction of the belt shall be as per IS.

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4.0 Sample
Sample shall be supplied along with offer for approval only for first time supplier and supplies made after 3 years..

5.0 Test certificate

5.1 The supplier shall submit the test certificate along with the bulk supply for

- c) Material quality
- d) Physical and chemical properties as per IS
- e) Static and Dynamic Load test as per IS.

5.2 The test certificate shall also indicate the following

- a) BHEL PO number
- b) Batch No. & Date

6.0 Packing
The safety belt shall be supplied, packed individually for protection from dust and damage..

7.0 Marking
The Safety belt shall be marked with the following information

- a) BHEL logo
- b) Supplier identity
- c) Sl. No. of belt
- d) Date & year of manufacturing

8.0 Inspection
Inspection will be carried out at our works with reference to the acceptable sample and test reports, BHEL will inspect at the works wherever required.

9.0 Guarantee Certificate
Guarantee Certificate to be given for any manufacturing defects along with its consignment for free replacement with in six months from the date of receipt at stores..

10.0 Enquiry specification
The PI and Enquiry shall have the latest copy of the specification as “ Safety Belt of (Pole work)Class “P” with or with out optional class of IS. and as per BHEL HSE Corporate standard _____.



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j) COTTON COVERALL (Dongri)

1.0 Scope

This standard covers the requirement of General purpose Cotton Coverall

2.0 Compliance with Standards

It shall comply with the standards

3.0 Technical Requirement

1. The Coverall shall be of single piece construction
2. It shall be made up of breathable cotton drill fabric suitable for industrial operation
3. It shall be stitched with cotton sewing thread as per IS
4. It shall have side pockets and top pocket
5. It shall have heavy duty zipper for front opening
6. It shall have press button at cuff
7. It shall have Velcro /Button for flap closure
8. Size shall be suitable for all workmen as per table

Dimensions (in Cms.)

Variant	Length	Chest Buttoned	Waist Ready	Hip	Sleeve length	Shoulder	Collar	Bottom of leg
Medium	153	115	120	122	61	46	43	58
Large	164	132	142	143	66	53	53	61
Ex.Large	168	142	147	148	66	56	56	61

4.0 Sample

Sample shall be supplied along with offer for approval only for first time supplier and supplies made after 3 years.

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5.0

Test certificate

5.1

The supplier shall submit the test certificate along with the bulk supply for

a) Quality of fabric

b) Physical and chemical properties

5.2

The test certificate shall also indicate the following

a) BHEL PO number

b) Batch No. & Date

6.0

Packing

The coverall shall be packed in individual polythene bags to prevent dust and damage

7.0

Marking

The Suit shall be marked with the following information

a) ISI/CE mark

b) BHEL logo

c) Supplier identity

d) Date & year of manufacturing

8.0

Inspection

Inspection will be carried out at our works with reference to the acceptable sample and test reports, BHEL will inspect at the works wherever required.

9.0

Guarantee Certificate

Guarantee Certificate to be given for any manufacturing defects along with its consignment for free replacement with in six months from the date of receipt at stores..

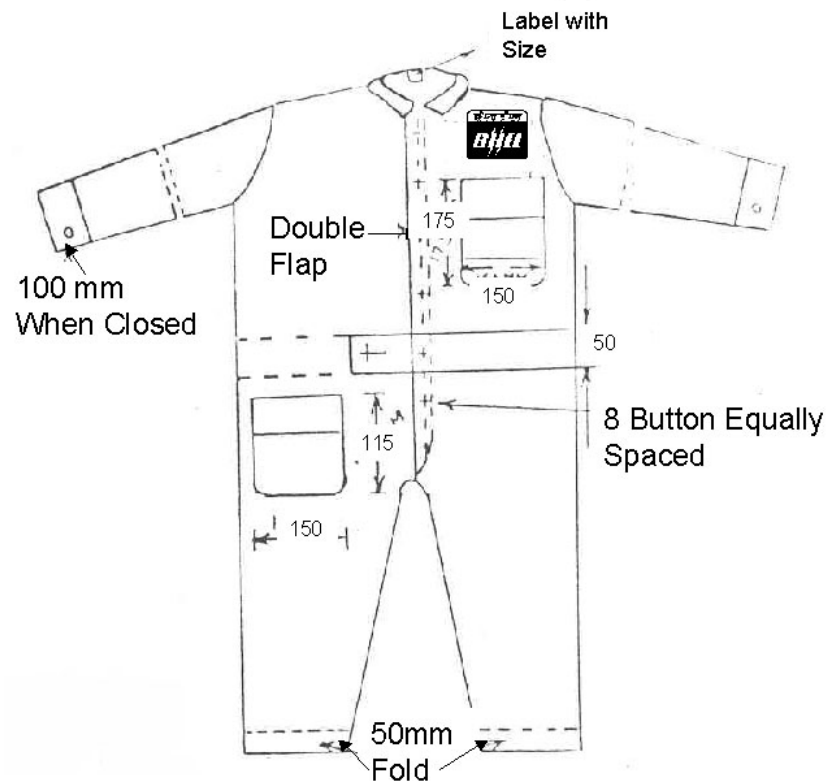
10.0

Enquiry specification

The PI and Enquiry shall have the latest copy of the specification as “Cotton Coverall” size Medium / Large / Extra Large , as per BHEL Corporate standard _____”.



COTTON COVERALL (Dongri)





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k) OVER COAT (Gents)

1.0 Scope

This standard covers the requirement of General purpose Over coat.

2.0 Compliance with Standards

It shall comply with the standards

3.0 Technical Requirement

1. The over coat shall be of single piece construction
2. It shall be made up of breathable cotton drill fabric khaki / Olive green in colour suitable
3. for industrial operation
4. It shall be stitched with cotton sewing thread as per IS
5. It shall have side pockets and top pocket
6. It shall have 8 buttons equally spaced for front opening
7. It shall have press button at cuff
8. Size shall be suitable for all workmen as per table

Dimensions (in Cms.)

Variant	Length	Chest	Waist	Hip	Sleeve length	Shoulder	Collar
Medium	140	129	132	145	62	48	50
Large	150	140	145	145	64	53	56

4.0 Sample

Sample shall be supplied along with offer for approval only for first time supplier and supplies made after 3 years.

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5.0 Test certificate

5.1 The supplier shall submit the test certificate along with the bulk supply for

- a) Quality of fabric
- b) Physical and chemical properties

5.2 The test certificate shall also indicate the following

- a) BHEL PO number
- b) Batch No. & Date

6.0 Packing

The Over coat shall be packed in individual polythene bags to prevent dust and damage

7.0 Marking

The Coat shall be marked with the following information

- a) ISI/CE mark
- b) BHEL logo
- c) Supplier identity
- d) Date & year of manufacturing

8.0 Inspection

Inspection will be carried out at our works with reference to the acceptable sample and test reports, BHEL will inspect at the works wherever required.

9.0 Guarantee Certificate

Guarantee Certificate to be given for any manufacturing defects along with its consignment for free replacement with in six months from the date of receipt at stores.

10.0 Enquiry specification

The PI and Enquiry shall have the latest copy of the specification as “Cotton Over Coat” size Medium / Large as per BHEL Corporate standard _____”.



OVER COAT (Gents)





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I) OVER COAT (Ladies)

1.0 Scope

This standard covers the requirement of General purpose Cotton Coverall

2.0 Compliance with Standards

It shall comply with the standards

3.0 Technical Requirement

1. The over coat shall be of single piece construction
2. It shall be made up of breathable cotton drill fabric khaki / Olive green in colour suitable
3. for industrial operation
4. It shall be stitched with cotton sewing thread as per IS
5. It shall have side pockets and top pocket
6. It shall have 5 buttons equally spaced for front opening
7. It shall have press button at cuff
8. Size shall be suitable for all workmen as per table

Dimensions (in Cms.)

Variant	Length	Chest	Waist	Hip	Sleeve	Shoulder	Bottom
Medium	122	130	140	150	62	50	160
Large	164	140	150	160	65	58	170

4.0 Sample

Sample shall be supplied along with offer for approval only for first time supplier and supplies made after 3 years.

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5.0

Test certificate

5.1

The supplier shall submit the test certificate along with the bulk supply for

a) Quality of fabric

b) Physical and chemical properties

5.2

The test certificate shall also indicate the following

a) BHEL PO number

b) Batch No. & Date

6.0

Packing

The Over coat shall be packed in individual polythene bags to prevent dust and damage

7.0

Marking

The Coat shall be marked with the following information

a) ISI/CE mark

b) BHEL logo

c) Supplier identity

d) Date & year of manufacturing

8.0

Inspection

Inspection will be carried out at our works with reference to the acceptable sample and test reports, BHEL will inspect at the works wherever required.

9.0

Guarantee Certificate

Guarantee Certificate to be given for any manufacturing defects along with its consignment for free replacement with in six months from the date of receipt at stores..

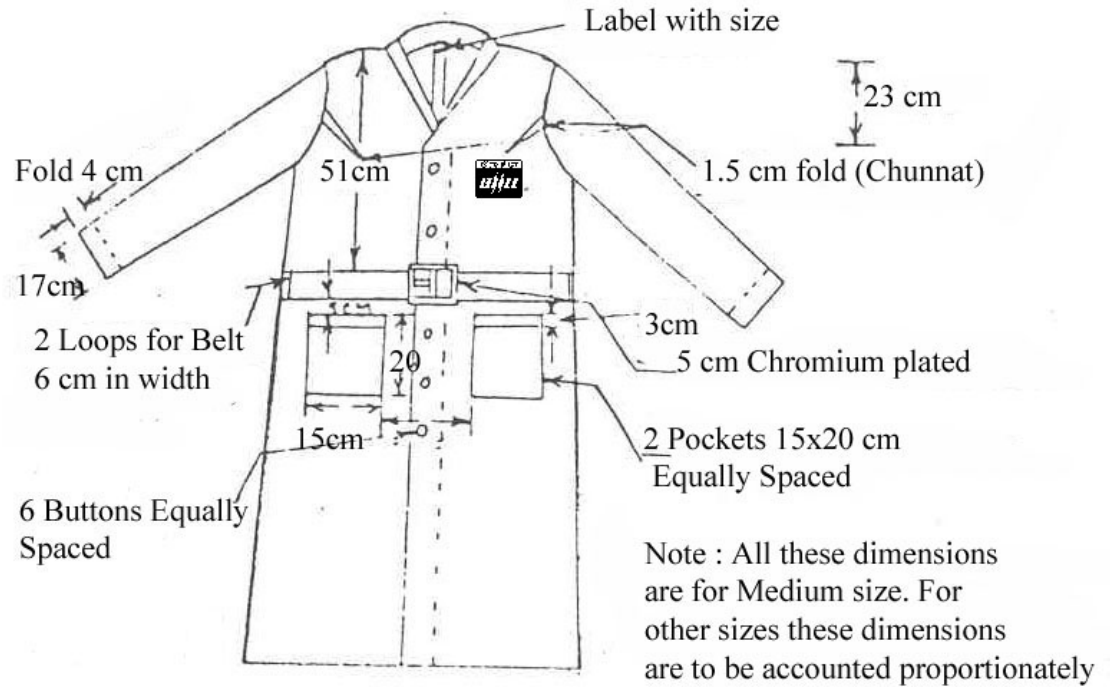
10.0

Enquiry specification

The PI and Enquiry shall have the latest copy of the specification as “Over Coat” size Medium / Large as per BHEL Corporate standard _____”.



OVER COAT (Ladies)





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a) KEVLAR GLOVES 12”

1.0 Scope

This standard covers the requirement of Kevlar gloves 12”

2.0 Compliance with Standards

- a) It shall comply with the standards IS 6994 – 1973. Reaffirmed 1996.
- b) Lining cloth confirm to IS 1535-1979, Reaffirmed 1998

3.0 Technical Requirement

- 1. They shall be made out of Kevlar cloth.
- 2. They shall be five fingers type of clute pattern .
- 3. They shall have double padded Lining of Woolen Cloth inside finger and Palm portion to withstand temperature of 600°C.
- 4. They shall have thick, good quality Canvas Lining inside the gloves such away to absorb sweating.

4.0 Sample

Sample shall be supplied along with offer for approval only for first time supplier and supplies made after 3 years.

5.0 Test certificate

5.1 The supplier shall submit the test certificate along with the bulk supply for

- 1. Kevlar properties
- 2. Loss on ignition
- 3. Flammable resistance

5.2 The test certificate shall indicate the following

- a) BHEL PO number
- b) Batch No. & Date

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6.0 Packing

The gloves shall be supplied, packed individually protection from dust and damage

7.0 Marking

The gloves shall be marked with the following information

- a) BHEL logo
- b) Supplier identity
- c) Date & year of manufacturing

8.0 Inspection

Inspection will be carried out at our works with reference to the acceptable sample and test report, BHEL will inspect at the works wherever required.

9.0 Guarantee Certificate

Guarantee Certificate to be given for any manufacturing defects along with its consignment for free replacement with in six months from the date of receipt at stores

10.0 Enquiry specification

The PI and Enquiry shall have latest copy of the specification as “Kevlar gloves” as per BHEL Corporate standard _____”.



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b) KEVLAR GLOVES 14" & 16" (L & R)

1.0 Scope

This standard covers the requirement of asbestos gloves 14" & 16 (L & R)

2.0 Compliance with Standards

- a) It shall comply with the standards IS 6994 – 1970
- b) Lining cloth confirm to IS 2573 –1975

3.0 Technical Requirement

- 1. They shall be made out of Kevlar cloth.
- 2. They shall be five fingers type of clute pattern .
- 3. They shall have double padded Lining of Woolen Cloth inside finger and Palm portion to withstand temperature of 1000°C.
- 4. They shall have thick good quality Canvas Lining inside the gloves such away to absorb sweating.

4.0 Sample

Sample shall be supplied along with offer for approval only for first time supplier and supplies made after 3 years.

5.0 Test certificate

5.1 The supplier shall submit the test certificate along with the bulk supply for

- a) Kevlar properties
- b) Loss on ignition
- c) Flammable resistance

5.2 The test certificate shall indicate the following.

- a) BHEL PO number
- b) Batch No. & Date

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6.0 Packing

The gloves shall be supplied, packed individually for protection from damage and dust.

7.0 Marking

The gloves shall be marked with the following information

- a) BHEL logo
- b) Supplier identity
- c) Date & year of manufacturing

8.0 Inspection

Inspection will be carried out at our works with reference to the acceptable sample and test report, BHEL will inspect at the works wherever required.

9.0 Guarantee Certificate

Guarantee Certificate to be given for any manufacturing defects along with its consignment for free replacement with in six months from the date of receipt at stores.

10.0 Enquiry specification

The PI and Enquiry shall have the latest copy of the specification as “Kevlar gloves1 4” & 16 (L & R)” as per BHEL Corporate standard _____”.



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c) CLEAN CLOTH (Hosiery) GLOVES

1.0 Scope

This standard covers the requirement of Clean Cloth (Hosiery) Gloves

2.0 Compliance with Standards

It shall comply with the standards

3.0 Technical Requirement

1. They shall be of Five Fingers type Gloves, made out of Bleached Thick White Clean Cloth (Hosiery cloth) double layer.
2. They shall be provided with Flannel Cloth Lining inside finger and palm portion.
3. They shall be provided with an Elastic Band at the knit wrist.
4. The size shall be 14".

4.0 Sample

Sample shall be supplied along with offer for approval only for first time supplier and supplies made after 3 years.

5.0 Test certificate

- 5.1 The supplier shall submit the test certificate along with the bulk supply for
 - a) Quality of the cloth
 - b) Physical & Chemical properties
- 5.2 The test certificate shall indicate the following.
 - a) BHEL PO number
 - b) Batch No. & Date

6.0 Packing

The gloves shall be supplied, packed individually in good quality protective cover for protection from damage and dust.

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7.0 Marking

The gloves shall be marked with the following information

- a) BHEL logo
- b) Supplier identity
- c) Date & year of manufacturing

8.0 Inspection

Inspection will be carried out at our works with reference to the acceptable sample and test report, BHEL will inspect at the works wherever required.

9.0 Guarantee Certificate

Guarantee Certificate to be given for any manufacturing defects along with its consignment for free replacement with in six months from the date of receipt at stores.

10.0 Enquiry specification

The PI and Enquiry shall have the latest copy of the specification as “Clean Cloth (Hosiery) Gloves” as per BHEL Corporate standard _____”.



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d) CANVAS GLOVES

1.0 Scope

This standard covers the requirement of canvas gloves

2.0 Compliance with Standards

1. Have uniform thickness as per Is: 1424 – 1983 Reaffirmed 1999.
2. Clute pattern as per IS : 6994 – 1973 Reaffirmed – 1996.

3.0 Technical Requirement

1. They shall be made out of good quality, thick canvas cloth
2. They shall be Five Fingers type clute pattern as per IS
3. The stitches shall be 2.5 mm with the end of all stitching securely back stitched.
4. The cotton sewing thread conforming to Variety No. 23 shall be used.
5. The size shall be 14” and shall give protection against dirt, dust, oil, grease etc.

4.0 Sample

Sample shall be supplied along with offer for approval only for first time supplier and supplies made after 3 years.

5.0 Test certificate

5.1 The supplier shall submit the test certificate along with the bulk supply for

- a. Quality of canvas / Strength
- b. Physical and chemical property

5.2 The test certificate shall indicate the following

- c) BHEL PO number
- d) Batch No. & Date

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6.0 Packing

The gloves shall be supplied, packed for protection from damage and dust.

7.0 Marking

The gloves shall be marked with the following information

- b) BHEL logo
- c) Supplier identity
- d) Date & year of manufacturing

8.0 Inspection

Inspection will be carried out at our works with reference to the acceptable sample and test report, BHEL will inspect at the works wherever required.

9.0 Guarantee Certificate

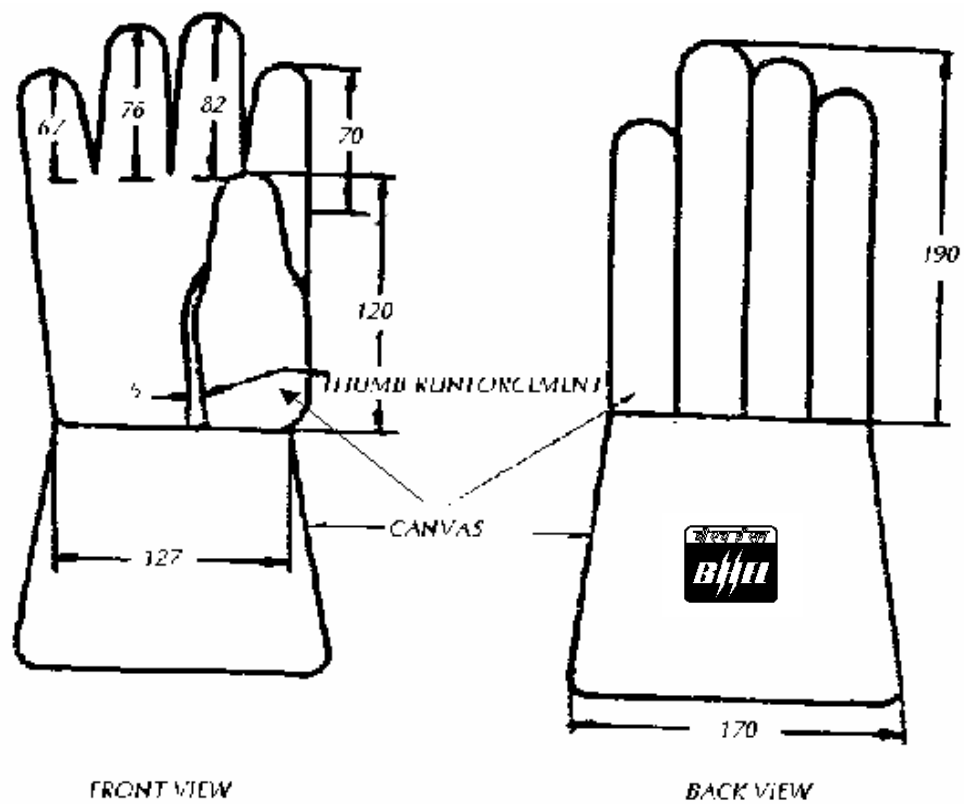
Guarantee Certificate to be given for any manufacturing defects along with its consignment for free replacement with in six months from the date of receipt at stores.

10.0 Enquiry specification

The PI and Enquiry shall have the latest copy of the specification as “Canvas Gloves” as per BHEL Corporate standard _____”.



CANVAS GLOVES





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e) LEATHER GLOVES 10” , 12” , 16”

1.0 Scope

This standard covers the requirement of Leather gloves

2.0 Compliance with Standards

- a) It shall comply with the standards IS: 6994 –1973 Reaffirmed – 1996.

3.0 Technical Requirement

1. Good Quality of Chrome – tanned Cow / Young Buffalo Split Leather as per IS Shall be used for palm.
2. Good Quality of Chrome – tanned Cow / Young , Buffalo split leather should be used for Finger’s back and front cuff.
3. Leather for the back cuff and reinforcement pieces should be dyed in Brown colour and Grain – Printed.
4. The leather used for the palm, Finger’s back and the Front cuff should be of natural colour.
5. The thickness of the Leather should be from 1.5 mm to 1.8 mm
6. The nylon thread of sewing cotton 60S / 6 Thread Shall be used.
7. The Gloves should be machine – stitched and the number of the stitches should be 3 per cm.
8. It shall have the double line stitching at reinforcement.

4.0 Sample

Sample shall be supplied along with offer for approval only for first time supplier and supplies made after 3 years.

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5.0

Test certificate

5.1

The supplier shall submit the test certificate along with the bulk supply for

a) Quality of the Leather

b) Physical & Chemical properties

5.2

The test certificate shall indicate the following.

a) BHEL PO number

6.0

Packing

The gloves shall be supplied, packed for protection from damage and dust.

7.0

Marking

The gloves shall be marked with the following information

a) BHEL logo

b) Supplier identity

c) Date & year of manufacturing

8.0

Inspection

Inspection will be carried out at our works with reference to the acceptable sample and test report, BHEL will inspect at the works wherever required.

9.0

Guarantee Certificate

Guarantee Certificate to be given for any manufacturing defects along with its consignment for free replacement with in six months from the date of receipt at stores.

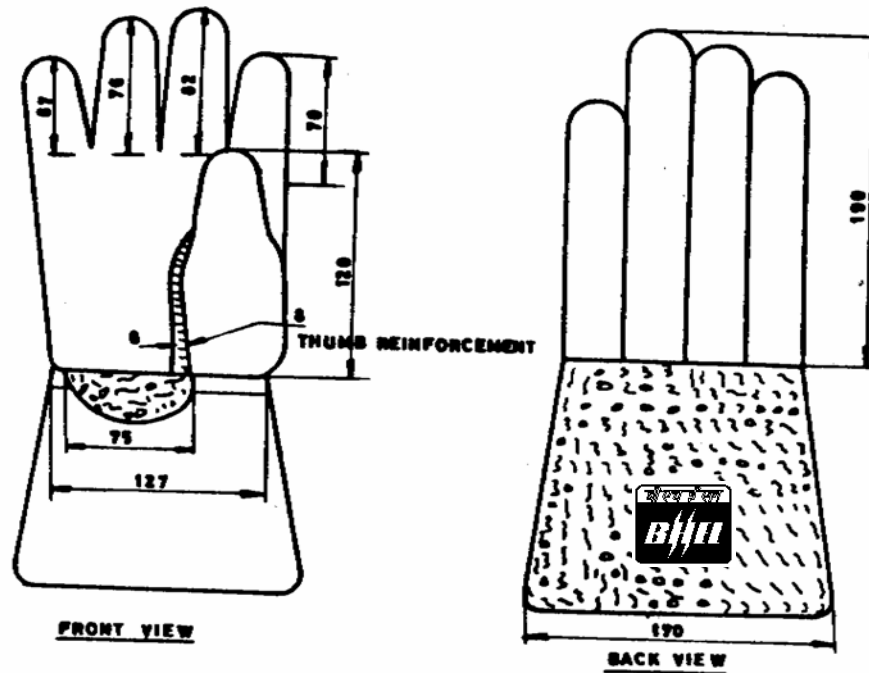
10.0

Enquiry specification

The PI and Enquiry shall have the latest copy of the specification as “Leather Gloves” as per BHEL Corporate standard size_____”.



LEATHER GLOVES 10", 12", 16"



All Dimensions in mm



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f) PVC HAND GLOVES - 14"

1.0 Scope

This standard covers the requirement of PVC hand gloves - 14"

2.0 Compliance with Standards

It shall comply with the standards

3.0 Technical Requirement

1. They shall be made out of thick good quality flexible PVC.
2. They shall be five – fingers type. Size 14".
3. They shall have Canvas or Hoisery material Lining inside.
4. They shall give protection against oil, acid and alkali.

4.0 Sample

Sample shall be supplied along with offer for approval only for first time supplier and supplies made after 3 years.

5.0 Test certificate

- 5.1 The supplier shall submit the test certificate along with the bulk supply for
- a. Material quality
 - b. Oil and chemical resistance

- 5.2 The test certificate shall also indicate the following

- a. BHEL PO number
- b. Batch No. & Date

6.0 Packing

The gloves shall be supplied, packed individually for protection from damage and dust

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7.0 Marking

The gloves shall be marked with the following information

- a) BHEL logo
- b) Supplier identity
- c) Date & year of manufacturing

8.0 Inspection

Inspection will be carried out at our works with reference to the acceptable sample and test report, BHEL will inspect at the works wherever required.

9.0 Guarantee Certificate

Guarantee Certificate to be given for any manufacturing defects along with its consignment for free replacement with in six months from the date of receipt at stores.

10.0 Enquiry specification

The PI and Enquiry shall have the latest copy of the specification as “PVC Hand Gloves - 14” as per BHEL Corporate standard _____”.



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g) ACID AND ALKALI PROOF RUBBER GLOVES

1.0 Scope

This standard covers the requirement of Acid and alkali proof rubber gloves

2.0 Compliance with Standards

It shall comply with the standards

3.0 Technical Requirement

1. It shall be made up of good quality, thick Rubber in size and 16". Black /yellow in colour
2. It shall give protection against Industrial Acid and Alkali
3. It shall be of five finger type easy to wear.

4.0 Sample

Sample shall be supplied along with offer for approval only for first time supplier and supplies made after 3 years.

5.0 Test certificate

5.1 The supplier shall submit the test certificate along with the bulk supply for

1. Quality of rubber
2. Physical and chemical properties
3. Acid and Alkali resistance

5.2 The test certificate shall also indicate the following

- a) BHEL PO number
- b) Batch No. & Date

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6.0 Packing

The gloves shall be supplied, packed for protection from damage and dust.

7.0 Marking

The goggle shall be marked with the following information

- a) BHEL logo
- b) Supplier identity
- c) Date & year of manufacturing

8.0 Inspection

Inspection will be carried out at our works with reference to the acceptable sample and test report, BHEL will inspect at the works wherever required.

9.0 Guarantee Certificate

Guarantee Certificate to be given for any manufacturing defects along with its consignment for free replacement with in six months from the date of receipt at stores.

10.0 Enquiry specification

The PI and Enquiry shall have the latest copy of the specification as “Acid and alkali proof rubber gloves” as per BHEL Corporate standard _____”.



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h) WORK GLOVES (Leather & Canvas)

1.0 Scope

This standard covers the requirement of work gloves (Leather & Canvas)

2.0 Compliance with Standards

- a) It shall comply with the standards IS: 6994 – 1973 Reaffirmed – 1996
- 4. Cloth confirm to IS 1535 –1979 Reaffirmed – 1998

3.0 Technical Requirement

- 1. They shall be made out of good quality split leather at palm.
- 2. They shall be of five finger type.
- 3. The palm shall be provided with L piece reinforcement padding.
- 4. The back fingers shall be made out of good quality thick canvas.
- 5. The cuff portion shall be made out of canvas.
- 6. The size shall be 14”.

4.0 Sample

Sample shall be supplied along with offer for approval only for first time supplier and supplies made after 3 years.

5.0 Test certificate

5.1 The supplier shall submit the test certificate along with the bulk supply for

- a) Quality of the Leather
- b) Quality of the Canvas
- c) Physical & Chemical properties

5.2 The test certificate shall also indicate the following.

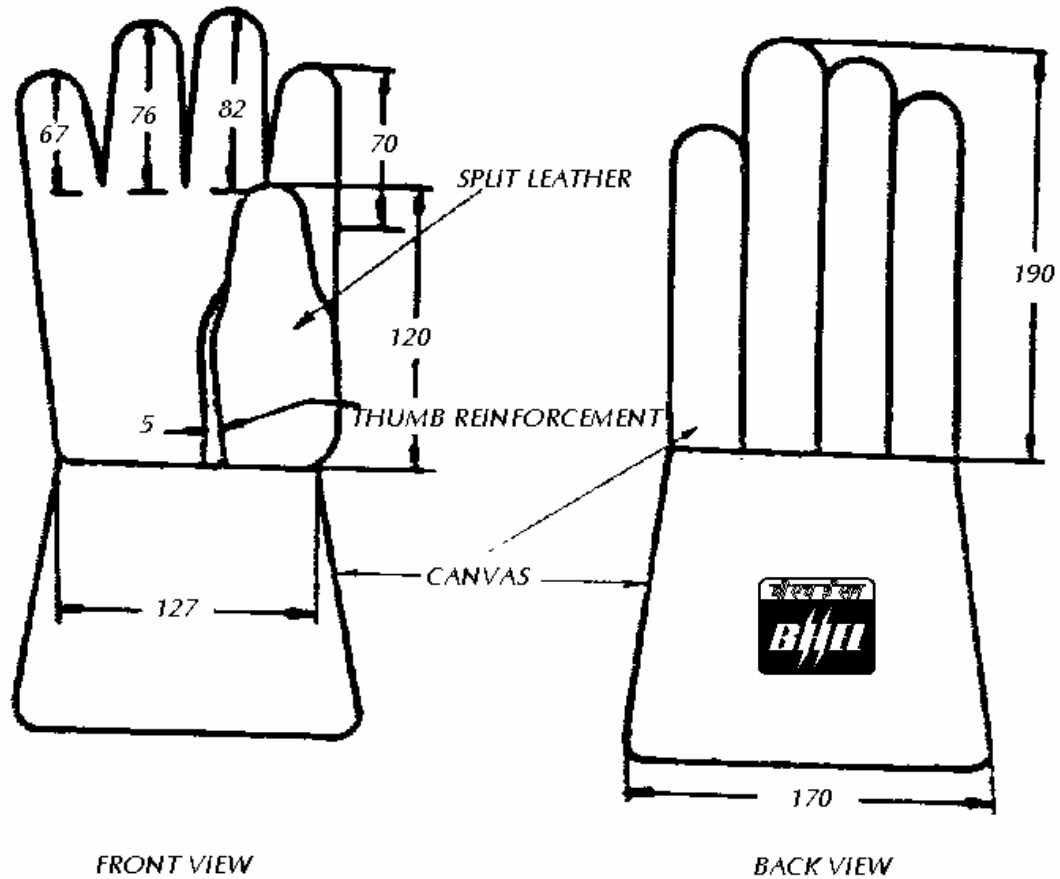
- a) BHEL PO number
- b) Batch No. & Date

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6.0 Packing	The gloves shall be supplied, packed individually for protection from damage and dust	
7.0 Marking	The gloves shall be marked with the following information	
	a) BHEL logo b) Supplier identity c) Date & year of manufacturing	
8.0 Inspection	Inspection will be carried out at our works with reference to the acceptable sample and test report, BHEL will inspect at the works wherever required	
9.0 Guarantee Certificate	Guarantee Certificate to be given for any manufacturing defects along with its consignment for free replacement with in six months from the date of receipt at stores.	
10.0 Enquiry specification	The PI and Enquiry shall have the copy of the specification as “Work Gloves (Leather & Canvas)” as per BHEL Corporate standard _____”.	



WORK GLOVES (Leather & Canvas)





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i) ELECTRICAL RESISTANCE RUBBER GLOVES

1.0 General

This standard covers the requirement Rubber Hand Gloves for Electrical Purpose.

2.0 Compliance with Standards

It shall comply with IS 4770 – 1991, Reaffirmed 2001

3.0 Technical Requirement

- 1) The material shall be of natural or synthetic rubber, gauntlet type, Type 4 (17000 Volts) of the IS.
- 2) The gloves shall have a smooth finish and the cuff edges shall be finished with a roll or a reinforcing strip of rubber.
- 3) The gloves shall free from defects like patches, blisters, porosity, embedded foreign matter or any other physical defect.
- 4) The gloves shall be of the shape and dimensions given in fig-2, table-6 of the IS.
- 5) The gloves shall conform to the tests as per IS.
- 6) The colour coding of the gloves shall be as per IS.
- 7) The gloves shall be marked with size and type, Max. working voltage, etc as per IS.

4.0 Sample

Sample shall be supplied along with offer for approval only for first time supplier and supplies made after 3 years.

5.0 Test certificate

5.1 The supplier shall submit the test certificate along with the bulk supply for

1. Quality of rubber
2. Physical and chemical properties
3. Electrical resistance

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5.2

The test certificate shall indicate along with the bulk supply for

- a) BHEL PO number
- b) Batch No. & Date

6.0

Packing

The gloves shall be supplied, packed for protection from dust and damage.

7.0

Marking

The goggle shall be marked with the following information

- a) BHEL logo
- b) Supplier identity
- b) Date & year of manufacturing
- d) Date & year testing
- e) Test voltage
- f) Working voltage

8.0

Inspection

Inspection will be carried out at our works with reference to the acceptable sample and test report, BHEL will inspect at the works wherever required.

9.0

Guarantee Certificate

Guarantee Certificate to be given for any manufacturing defects along with its consignment for free replacement with in six months from the date of receipt at stores.

10.0

Enquiry specification

The PI and Enquiry shall have the latest copy of the specification as “Acid and alkali proof rubber gloves” as per BHEL Corporate standard _____”.



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j) LEATHER HAND SLEEVE

1.0 Scope

This standard covers the requirement of Leather hand sleeve

2.0 Compliance with Standards

It shall comply with the standards IS: 6994-1973 Reaffirmed 1996.

3.0 Technical Requirement

- 1) Good Quality of Chrome – tanned Cow / Young Buffalo Split Leather as per IS.
- 2) It shall be provided with good quality thick canvas lining
- 3) It shall be provided with adjustable elastic band in two/three places for proper fixing at arm
- 4) The thickness of the Leather should be from 1.5 mm to 1.8 mm
- 5) The nylon thread of sewing cotton 60S / 6 Thread Shall be used.
- 6) It shall have the double line stitching and easy to fold
- 7) The length shall be 20”.

4.0 Sample

Sample shall be supplied along with offer for approval only for first time supplier and supplies made after 3 years.

5.0 Test certificate

5.1 The supplier shall submit the test certificate along with the bulk supply for

- d) Quality of the Leather
- e) Physical & Chemical properties

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5.2 The test certificate shall indicate along with the bulk supply for

- a) BHEL PO number
- b) Batch No. & Date

6.0 Packing

The hand sleeve shall be supplied, packed for protection from damage and dust.

7.0 Marking

The sleeve shall be marked with the following information

- a) BHEL logo
- b) Supplier identity
- c) Date & year of manufacturing

8.0 Inspection

Inspection will be carried out at our works with reference to the acceptable sample and test report, BHEL will inspect at the works wherever required.

9.0 Guarantee Certificate

Guarantee Certificate to be given for any manufacturing defects along with its consignment for free replacement with in six months from the date of receipt at stores.

10.0 Enquiry specification

The PI and Enquiry shall have the latest copy of the specification as “Leather Hand sleeve” as per BHEL Corporate standard size_____”.



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k) BARRIER CREAM

1.0 Scope

This standard covers the requirement of Barrier Cream for protecting the hands from Oil, Acid and alkali, Grease etc., as an invisible gloves.

2.0 Compliance with Standards

It shall comply with the standards

3.0 Technical Requirement

- a. It shall be suitable to apply before the work and act as invisible glove. .
- b. It shall give protection from materials like acid and alkali, oil, grease, adhesives and industrial disinfectants
- c. It shall give protection to hand and not cause irritation , dermatitis or discomfort to the user.
- d. It shall be non greasy and completely safe
- e. It shall give maximum protection for three to four hours..
- f. It shall not interfere with normal skin respiration

4.0 Sample

Sample shall be supplied along with offer for approval only for first time supplier and supplies made after 3 years.

5.0 Test certificate

5.1 The supplier shall submit the test certificate along with the bulk supply for

1. Physical & Chemical properties
2. Primary skin irritation

5.2 The test certificate shall also indicate the following.

- a) BHEL PO number
- b) Date and Year of manufacturing.

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6.0 Packing

The Barrier creams shall be supplied, packed individually for protection from damage and dust.

7.0 Marking

The Cream shall be marked with the following information

a) BHEL logo

b) Supplier identity

c) Date & year of manufacturing

d) Shelf life

8.0 Inspection

Inspection will be carried out at our works with reference to the acceptable sample and test report, BHEL will inspect at the works wherever required.

9.0 Guarantee Certificate

Guarantee Certificate to be given for any manufacturing defects along with its consignment for free replacement with in six months from the date of receipt at stores.

10.0 Enquiry specification

The PI and Enquiry shall have the latest copy of the specification as “Barrier cream for.....” as per BHEL Corporate standard _____”.



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I) HAND CLEANSER

1.0 Scope

This standard covers the requirement of Hand cleanser.

2.0 Compliance with Standards

It shall comply with the standards

3.0 Technical Requirement

1. It shall be suitable to clean the hands after work.
2. It shall give protection to hand and not cause irritation , dermatitis or discomfort to the user.
3. It shall completely remove the residual oil, grease, acid, alkali and industrial disinfectants
4. It shall be non greasy and completely safe
5. It shall not interfere with normal skin respiration

4.0 Sample

Sample shall be supplied along with offer for approval only for first time supplier and supplies made after 3 years.

5.0 Test certificate

5.1 The supplier shall submit the test certificate along with the bulk supply for

- a) Physical & Chemical properties
- b) Primary skin irritation

5.2 The test certificate shall indicate along with the bulk supply for

- a) BHEL PO number
- b) Date and Year of manufacturing

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6.0

Packing

The Hand cleanser shall be supplied, packed individually for protection from damage and dust.

7.0

Marking

The cleanser shall be marked with the following information

a)

BHEL logo

b)

Supplier identity

c)

Date & year of manufacturing

d)

Shelf life

8.0

Inspection

Inspection will be carried out at our works with reference to the acceptable sample and test report, BHEL will inspect at the works wherever required

9.0

Guarantee Certificate

Guarantee Certificate to be given for any manufacturing defects along with its consignment for free replacement with in six months from the date of receipt at stores.

10.0

Enquiry specification

The PI and Enquiry shall carry the specification as “Hand Cleanser.” as per BHEL Corporate standard _____”.



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a) KEVLAR SAFETY BOOTS

1.0 Scope

This standard covers the requirement of Kevlar Safety Boot

2.0 Compliance with Standards

- a) Bottom shall be good quality sole IS:638 – 1979. Reaffirmed 1998
- b) Inner toe tongue side lining – IS-3840 – 1996 Reaffirmed 2002
- c) Insole –IS-3840 – 1996 Reaffirmed 2002.
- d) Carbon steel toe cap IS-5852 – 2004.

3.0 Technical Requirement

- 1. The upper shall be made out of good quality Kevlar cloth.
- 2. It shall give protection from radiant heat fall of hot spatters / slag.
- 3. The upper shall have inner lining of good quality chrome tanned leather.
- 4. The upper shall be provided with good quality chrome tanned leather at the heel and toe portion.
- 5. The boots shall have the Flap and Buckle arrangement
- 6. It shall have the carbon steel Toe cap to the thickness of 1.5 mm and it should withstand the impact test as per IS .
- 7. It shall be provided with good quality Nit rile Rubber sole of 55A sole harness. with stand the hot spatters.
- 8. The upper shell and bottom Rubber sole shall be fixed by concealed stitching by using Linen Thread conforming to IS.
- 9. No Nail shall be used.
- 10. The construction shall be as per drawing.

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4.0

Sample
Sample shall be supplied along with offer for approval only for first time supplier and supplies made after 3 years.

5.0

Test certificate

5.1

The supplier shall submit the test certificate as per IS along with the bulk supply for

1. Leather quality
2. Kevlar quality
3. Heat resistance
4. Flammable resistance
5. Penetration resistance
6. Electrical resistance

5.2

The test certificate shall also indicate the following

- a. BHEL PO number
- b. Batch No. & Date

6.0

Packing

The Kevlar boot shall be supplied packed individually for protection from dust & damage

7.0

Marking
The goggle shall be marked with the following information

- a) BHEL logo
- b) Supplier identity
- c) Date & year of manufacturing

8.0

Inspection
Inspection will be carried out at our works with reference to the acceptable sample and test reports. BHEL will inspect at works wherever required.

9.0

Guarantee Certificate

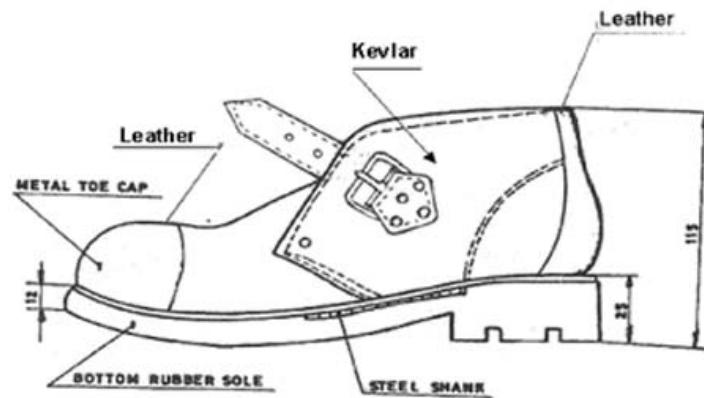
Guarantee Certificate to be given for any manufacturing defects along with its consignment for free replacement with in six months from the date of receipt at stores.

10.0

Enquiry specification
The PI and Enquiry shall have the latest copy of the specification as “Kevlar Safety Boot” as per BHEL Corporate standard Size_____”.



KEVLAR SAFETY BOOTS





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b) GUM BOOTS (Knee Boots)

1.0 Scope

This standard covers the requirement of Gum boots

2.0 Compliance with Standards

Carbon steel toe cap comply with IS : 5852 – 2004

3.0 Technical Requirement

1. Gum boots shall be made up of Rubber / PVC material of Duck Back / Tarzan make
2. It shall have inner lining of good quality cotton / cloth.
3. It shall have the carbon steel Toe cap to the thickness of 1.5 mm and it should withstand the impact test as per IS
4. It shall be covered up to the knee and give protection from splashing of chemicals, oil, water etc.
5. It shall have the resistance to acids, alkali and oils.

4.0 Sample

Sample shall be supplied along with offer for approval only for first time supplier and supplies made after 3 years.

5.0 Test certificate

5.1 The supplier shall submit the test certificate along with the bulk supply for

- i. PVC/ Rubber quality
- ii. Water resistance
- iii. Chemical resistance
- iv. Penetration resistance
- v. Electrical resistance

5.2 The test certificate shall also indicate the following

- a) BHEL PO number
- b) Batch No. & Date

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6.0

Packing

The gum boot shall be supplied packed individually for protection from dust & damage

7.0

Marking

The gum boot shall be marked with the following information

1.

BHEL logo

2.

Supplier identity

3.

Date & year of manufacturing

8.0

Inspection

Inspection will be carried out at our works with reference to the acceptable sample and test reports. BHEL will inspect at works wherever required.

9.0

Guarantee Certificate

Guarantee Certificate to be given for any manufacturing defects along with its consignment for free replacement with in six months from the date of receipt at stores.

10.0

Enquiry specification

The PI and Enquiry shall have the latest copy of the specification as “Gum Boot” as per BHEL Corporate standard _____”.



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c) SAFETY SHOES (PU SOLE)

1.0 Scope

This standard covers the requirement of Safety Shoes (PU sole) to protect the feet and ankle in heavy engineering industry.

2.0 Compliance with Standards

1. Upper of the shoe shall conform to IS-5677 – 1986 Reaffirmed 1997.
2. Bottom shall be good quality of PU to IS-15298 – 2004
3. Inner toe tongue side lining 1.5 mm – IS-3840 – 1996 Reaffirmed 2002.
4. Insole –IS-3840 – 1996 Reaffirmed 2002.
5. Carbon steel toe cap IS-5852 – 2004 .

3.0 Technical Requirement

- 1 The boot upper and bottom sole shall be joined together by direct injection process.
- 2 Upper leather shall be good quality chrome tanned plain grain Cow / Buffalo leather 1.5mm thickness Brown / Black in colour.
- 3 The shoe shall be provided with lasting inner sole to the thickness of 3mm (Leather / leather board)
4. Vegetable Tanned soft Grain Leather, shall be used for insole (Sock lining) toe lining and side, tongue inner lining to the thickness of 1 mm. Natural yellow in colour.
5. The Eye lets shall be of Brass/Aluminum 3 numbers .inner dia 6mm, outer dia 12mm.
6. The shore harness of the bottom sole shall be 55 to 65 A.
7. The shoes are to be machine-stitched and no Nails shall be used shall be Free from nails.
8. Total weight shall not be exceeding 950 grams for pair.
9. It shall be provided with 6mm widths and 630mm length, cotton lace.
10. Construction, measurement shall be as per our drawing

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4.0 Sample
Sample shall be supplied along with offer for approval only for first time supplier and supplies made after 3 years.

5.0 TEST CERTIFICATE:

5.1 Suppliers shall submit the test certificates along with the bulk supply.

1. Leather quality

2. Heat resistance

3. Impact resistance

4. Penetration resistance

5. Electrical resistance

6. Oil and chemical resistance

5.2 Test Certificate shall also indicate the following

a) BHEL PO.No.

b) Batch No. & date

6.0 PACKING:
The shoes shall be supplied, packed in good quality card board box with **Two Pairs Of Cotton Lace As Spare.**

7.0 MARKING:
The shoe shall be marked with the following information

a) Size of the shoe,

b.)BHEL logo

c) Suppliers identity

d) Batch, Month and the year of the manufacturing.

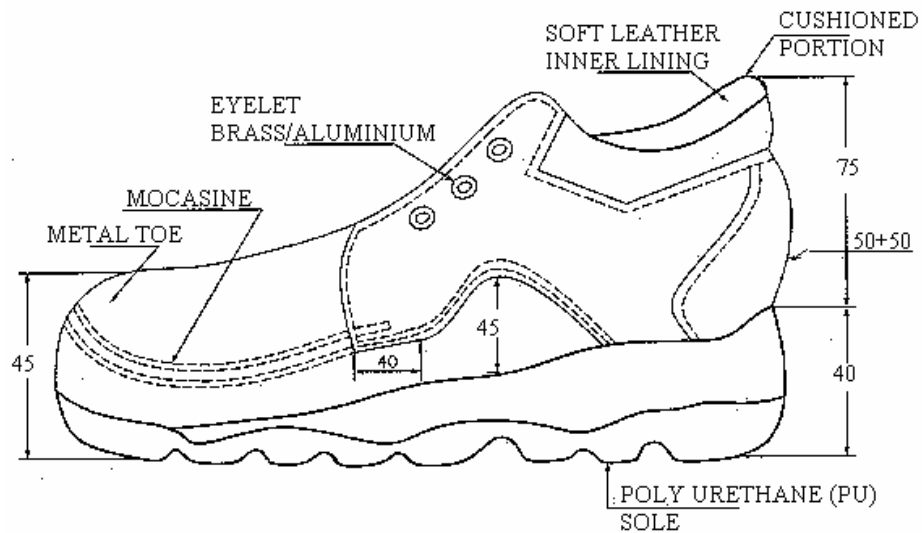
8.0 Inspection
Inspection will be carried out at our works with reference to the acceptable sample and test reports. BHEL will inspect at works wherever required.

9.0 GUARANTEE CERTIFICATE:
Guarantee Certificate to be given for any manufacturing defects along with its consignment from the date of receipts at stores for free replacement with in six month.

10.0 Enquiry specification
The PI and Enquiry shall also have the copy of the specification as “Asbestos Safety Boot” as per BHEL Corporate standard size_____”.



SAFETY SHOES (PU SOLE)





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d) SLIP IN TYPE SAFETY BOOTS

1.0 Scope

This standard covers the requirement of Slip In Type Safety Boot for welders

2.0 Compliance with Standards

1. Upper of the shoe shall conform to IS-5677 – 1986 Reaffirmed 1997.
2. Bottom shall be confirm IS:638 – 1979 Reaffirmed 1998 .
3. Inner toe tongue side lining 1.5 mm – IS-3840 – 1996 Reaffirmed 2002.
4. Insole –IS-3840 – 1996 Reaffirmed 2002.
5. Carbon steel toe cap IS-5852 – 2004 .

3.0 Technical Requirement

1. The Boot's upper should be made of Printed Grain Leather in black colour and it should cover the ankle.
2. Vegetable Tanned Leather shall be used for inside Leather lining.
3. The toe should be reinforced with carbon steel toe cap of 1.5mm thick and should withstand an impact test as per IS.
4. The bottom shall be provided with a good quality Nit rile Rubber of 55A shore harness as per IS
5. The bottom rubber sole and upper shell shall be joined together by Direct Injection Process.
6. The boots are to be machine-stitched and no Nails shall be used.
7. The boots should be provided with inside Zip arrangement for closing and opening. The zip shall be covered with leather in full length.
8. A rust-proof steel shank ribbed 1.2 to 1.5mm thick and not less than 12 mm in width shall be fitted to the waist of the Insole.
9. Construction and measurement as per drawing.

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4.0 Sample
Sample shall be supplied along with offer for approval only for first time supplier and supplies made after 3 years.

5.0 Test certificate

5.1 The supplier shall submit the test certificate as per IS along with the bulk supply

- 1. Leather quality
- 2. Heat resistance
- 3. Impact resistance
- 4. Penetration resistance
- 5. Electrical resistance
- 6. Oil and chemical resistance

5.2 The test certificate shall also indicate the following

- a) BHEL PO number
- b) Batch No. & Date

6.0 Packing

The Slip in type Safety boot shall be supplied, packed individually in good quality card board box

7.0 Marking

The goggle shall be marked with the following information

- a) BHEL logo
- b) Supplier identity
- c) Date & year of manufacturing

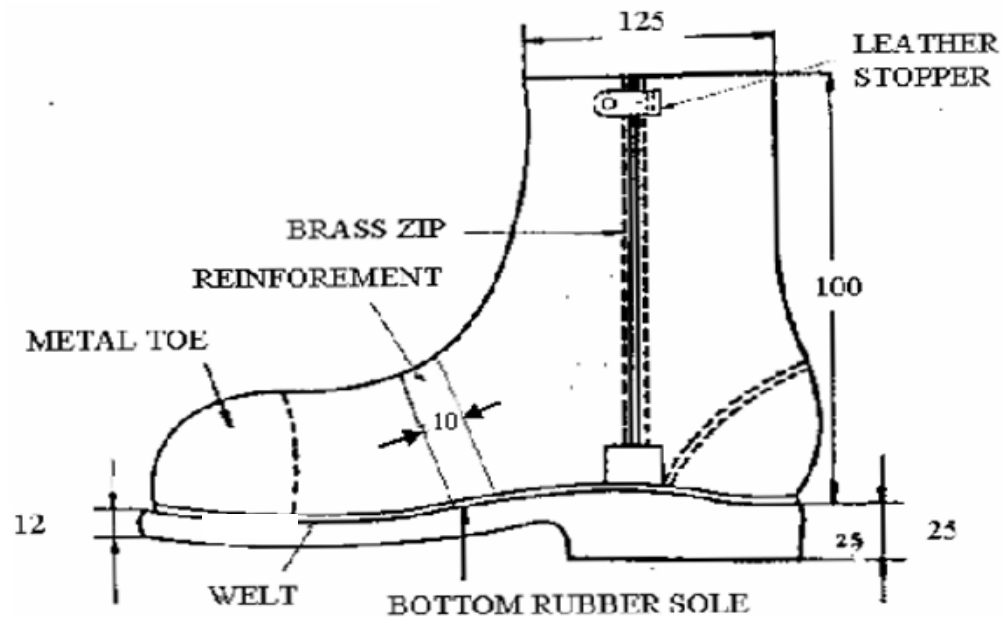
8.0 Inspection
Inspection will be carried out at our works with reference to the acceptable sample and test reports. BHEL will inspect at works wherever required.

9.0 Guarantee Certificate
Guarantee Certificate to be given for any manufacturing defects along with its consignment for free replacement with in six months from the date of receipt at stores

10.0 Enquiry specification
The PI and Enquiry shall have the latest copy of the specification as “Slip in type Safety Boot” as per BHEL Corporate standard size_____”.



SLIP IN TYPE SAFETY BOOTS





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e) GUM BOOTS (Ankle Boots)

1.0 Scope

This standard covers the requirement of Gum boots (Ankle boots) suitable for women.

2.0 Compliance with Standards

Carbon steel toe cap comply with IS : 5852 -2004

3.0 Technical Requirement

1. Gum boots shall be made up of Rubber / PVC material of Duck Back / Tarzan make
2. It shall have inner lining of good quality cotton / cloth.
3. It shall have the carbon steel Toe cap to the thickness of 1.5 mm and it should withstand the impact test as per IS
4. It shall be covered up to the Ankle and give protection from splashing of chemicals, oil, water etc.
5. It shall have the resistance to acids, alkali and oils.

4.0 Sample

Sample shall be supplied along with offer for approval only for first time supplier and supplies made after 3 years.

5.0 Test certificate

5.1 The supplier shall submit the test certificate along with the bulk supply for

1. PVC/ Rubber quality
2. Water resistance
3. Chemical resistance
4. Penetration resistance
5. Electrical resistance

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6.0 Packing

The gum boot shall be supplied, packed individually for protection from dust & damage

7.0 Marking

The gum boot shall be marked with the following information

1. BHEL logo
2. Supplier identity
3. Date & year of manufacturing

8.0 Inspection

Inspection will be carried out at our works with reference to the acceptable sample and test reports. BHEL will inspect at works wherever required.

9.0 Guarantee Certificate

Guarantee Certificate to be given for any manufacturing defects along with its consignment for free replacement within six months from the date of receipt at stores.

10.0 Enquiry specification

The PI and Enquiry shall have the latest copy of the specification as “Gum Boot” as per BHEL Corporate standard _____”.



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f) COTTON SOCKS

1.0 Scope

This standard covers the requirement of Cotton socks suitable for industrial usage along with Safety Shoes.

2.0 Compliance with Standards

It shall comply with IS : IS 3329- 1973 Reaffirmed 1999

3.0 Technical Requirement

1. It shall be made out of 2/40 cotton threads.
2. It shall have the construction as per the drawing
3. The measurements shall be as follows for **Size 29**

A Foot length	290 mm
B Leg length	290 mm
C Width of foot (M-N)	95 mm
D Width of Leg (K-L)	95 mm
E Height of the top	50 mm
F Width of top (Q-R)	60 mm
4. It shall be of ribbed type, having ribs not less than 24 in Nos.
5. The top portion shall be securely linked as per the IS.
6. The linking yarn shall conform to the S. No. 2.
7. The linking portion shall be free from the lumps and knots.
8. It shall be spliced at the heel and toe.
9. It shall have Elastic band of double elastic type, having the minimum of 70 Nos. of elastic band.
10. The colour shall be dark blue.

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4.0 Sample

Sample shall be supplied along with offer for approval only for first time supplier and supplies made after 3 years

5.0 Test certificate

5.1

The supplier shall submit the test certificate along with the bulk supply for

- a. Quality of the socks
- b. Quality of the elastic

5.2

The test certificate shall also indicate the following

- a) BHEL PO number
- b) Batch No. & Date

6.0 Packing

The socks shall be supplied packed individually for protection from dust & damage

7.0 Marking

The socks shall be marked with the following information

- a. BHEL logo
- b. Supplier identity
- c. Date & year of manufacturing

8.0 Inspection

Inspection will be carried out at our works with reference to the acceptable sample and test reports. BHEL will inspect at works wherever required.

9.0 Guarantee Certificate

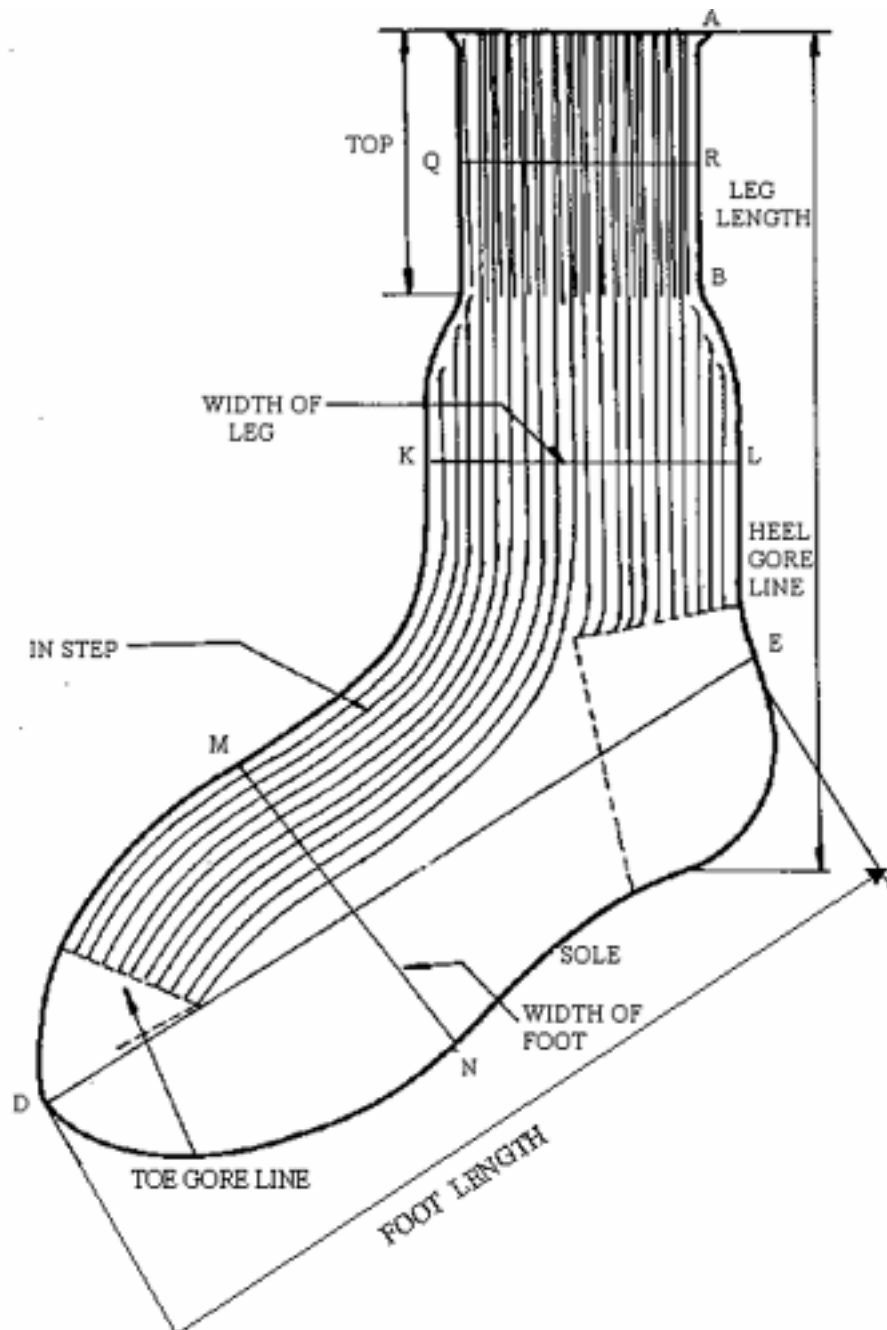
Guarantee Certificate to be given for any manufacturing defects along with its consignment for free replacement with in six months from the date of receipt at stores.

10.0 Enquiry specification

The PI and Enquiry shall have the latest copy of the specification as “Cotton Socks” as per BHEL Corporate standard _____”.



COTTON SOCKS





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g) LEATHER LEG GUARD

1.0 Scope

This standard covers the requirement of Leather Leg Guard

2.0 Compliance with Standards

- a. It shall have uniform thickness as per IS: 6153-1971
- b) It shall have physical and chemical properties as per IS: 6153-1971
- c) Thread Variety No. 6 of IS 1720 – 1978.

3.0 Technical Requirement

1. It shall be made up of Natural chrome Leather of thickness 1.5 mm.
2. It shall be suitable to worn over the shoes to protect the leg and foot.
3. It shall not allow any hot spatter / hot slag to fell on the foot/leg.
4. Nickel plated pin type Buckle arrangement to be provided for tying as in the drawing.
5. Sewing cotton 60 S/ 6 thread. can be used
6. The construction shall be as per drawing

4.0 Sample

Sample shall be supplied along with offer for approval only for first time supplier and supplies made after 3 years.

5.0 Test certificate

5.1 The supplier shall submit the test certificate along with the bulk supply for

- a) Leather Quality
- b) Physical and Chemical Properties

5.2 The test certificate shall also indicate the following

- a) BHEL PO number
- b) Batch No. & Date

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6.0 Packing

The leg guard shall be supplied, packed individually for protection from damage and dust.

7.0 Marking

The leg guard shall be marked with the following information

1. BHEL logo
2. Supplier identity
3. Date & year of manufacturing

8.0 Inspection

Inspection will be carried out at our works with reference to the acceptable sample and test reports. BHEL will inspect at works wherever required.

9.0 Guarantee Certificate

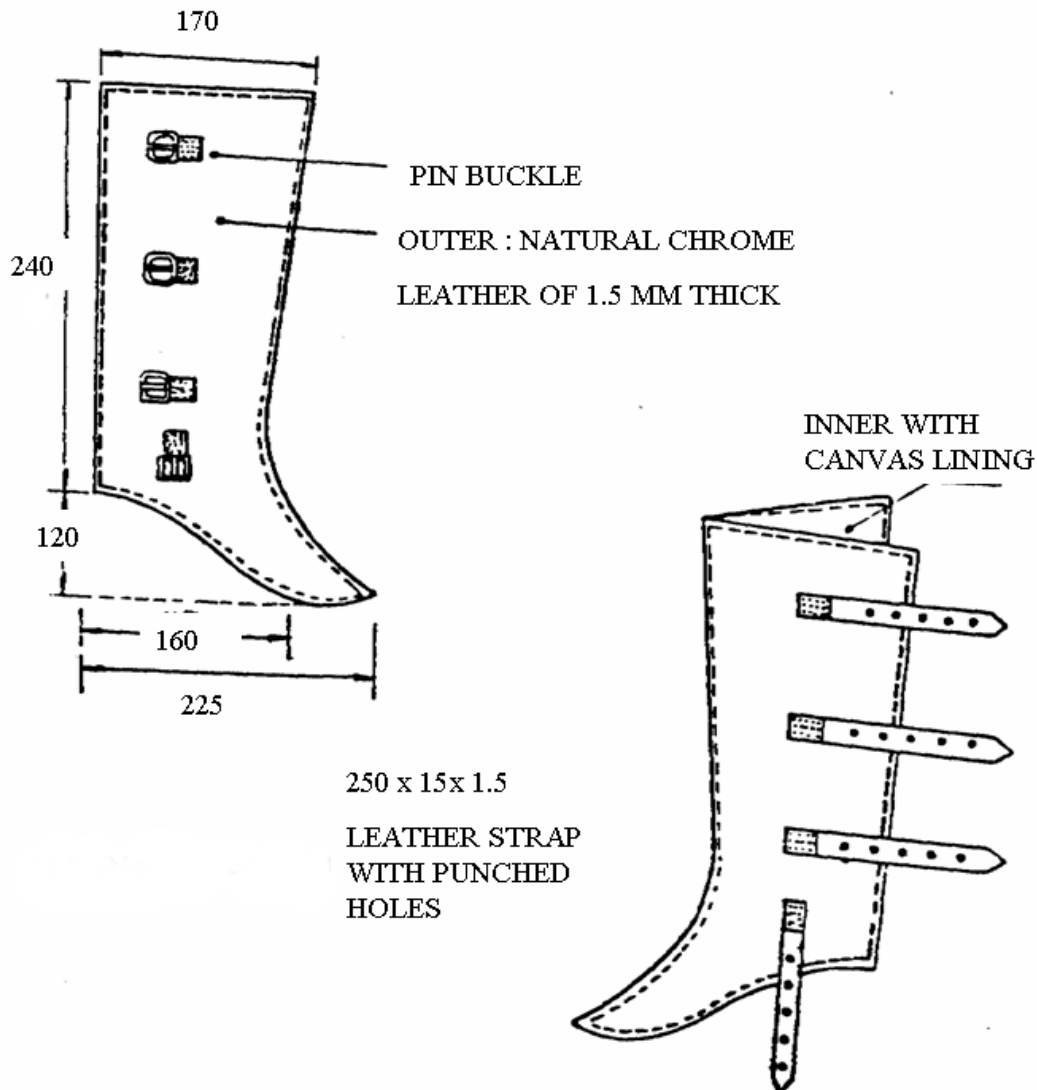
Guarantee Certificate to be given for any manufacturing defects along with its consignment for free replacement within six months from the date of receipt at stores.

10.0 Enquiry specification

The PI and Enquiry shall have the copy of the specification as “Leg Guard” as per BHEL Corporate standard _____”.



LEATHER LEG GUARD





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a) CLOTH RESPIRATOR (For Dust & Mist)

1.0 Scope

This standard covers the requirement of Cloth Respirator (for Dust & Mist)

2.0 Compliance with Standards

It shall comply with the standards IS: 9473 – 1980 Reaffirmed 1996.

3.0 Technical Requirement

- 1) It shall be suitable for Dust and Mist
- 2) It shall be of Foldable type suitable facilitate easy folding for storage if not in use.
- 3) It shall be composed of three layers.
 - i) The outermost layer shall filters out the largest dust particles,
 - ii) The innermost layer shall preserves the respirator's shape and
 - iii) The middle layer shall be composed of electrostatic filter media, which is capable of filtering the finest particles.
- 4) It shall have high filtration efficiency and low breathing resistance.
- 5) It shall have the adjustable Head Band made up of suitable material and shall have a very good elastic retention properties.
- 6) It shall have adjustable Aluminum Nose Clip, so as to conform to the nasal contours of the wearer and provides comfort and secured seal.

4.0 Sample

Sample shall be supplied along with offer for approval only for first time supplier and supplies made after 3 years.

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5.0

TEST CERTIFICATE:

5.1

Suppliers shall submit the test certificates along with the bulk supply.

a) Material quality
b) Filtering efficiency
c) Breathing resistance

5.2

Test Certificate shall also indicate the following

a) BHEL PO.No.
b) Batch No. & date

6.0

PACKING:

The respirator shall be supplied with good quality individual polythene cover packed in card board box.

7.0

Marking

h) ISI/ CE mark
i) BHEL logo
j) Supplier identity
k) Date & year of manufacturing

8.0

Inspection

Inspection will be carried out at our works with reference to the acceptable sample and test reports. BHEL will inspect at works wherever required.

9.0

Guarantee Certificate

Guarantee Certificate to be given for any manufacturing defects along with its consignment for free replacement with in six months from the date of receipt at stores.

10.0

Enquiry specification

The PI and Enquiry shall have the copy of the specification as “Cloth Respirator (for Dust & Mist)” as per BHEL Corporate standard _____”.



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b) CHEMICAL FUME RESPIRATOR

1.0 Scope

This standard covers the requirement of Chemical Fumes Respirator

2.0 Compliance with Standards

It shall comply with the standards

3.0 Technical Requirement

- 1) It shall be suitable for giving protection against organic vapours and particulate dusts
- 2) It shall be of Foldable type suitable facilitate easy folding for storage if not in use.
- 3) It shall be composed of three layers containing an exhalation valve
 - i) It shall be composed of electrostatic filter media, which is capable of filtering the finest particles.
 - ii) It shall have a layer of activated carbon media to provide reliable worker protection against nuisance level organic vapours
 - iii) It shall have a innermost layer to preserves the respirator's shape
- 4) It shall have high filtration efficiency against organic vapours and particulate dusts
- 5) It shall have low breathing resistance.
- 6) It shall have the adjustable Head Band made up of suitable material and shall have a very good elastic retention properties.
- 7) It shall have adjustable Aluminum Nose Clip, so as to conform to the nasal contours of the wearer and provides comfort and secured seal.

4.0 Sample

Sample shall be supplied along with offer for approval only for first time supplier and supplies made after 3 years.

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5.0

TEST CERTIFICATE:

5.1

Suppliers shall submit the test certificates along with the bulk supply.

a) Material quality
b) Filtering efficiency
c) Breathing resistance

5.2

Test Certificate shall also indicate the following

a) BHEL PO.No.
b) Batch No. & date

6.0

PACKING:

The respirator shall be supplied with good quality individual polythene cover packed in card board box.

7.0

Marking

a) ISI/ CE mark
b) BHEL logo
c) Supplier identity
d) Date & year of manufacturing

8.0

Inspection

Inspection will be carried out at our works with reference to the acceptable sample and test reports. BHEL will inspect at works wherever required.

9.0

Guarantee Certificate

Guarantee Certificate to be given for any manufacturing defects along with its consignment for free replacement with in six months from the date of receipt at stores.

10.0

Enquiry specification

The PI and Enquiry shall have the copy of the specification as “Chemical Fumes Respirator” as per BHEL Corporate standard _____”.



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c) RESPIRATOR FOR WELDING FUMES

1.0 Scope

This standard covers the requirement of Respirator for welding fumes

2.0 Compliance with Standards

It shall comply with the standards IS

3.0 Technical Requirement

- 1) It shall be suitable for organic vapours and particulate dusts
- 2) It shall be of Foldable type suitable facilitate easy folding for storage if not in use.
- 3) It shall be composed of three layers containing an exhalation valve.
 - i) It shall have an outermost layer to filters out the largest dust particles
 - ii) It shall have a the middle layer composed of electrostatic filter media, which is capable of filtering the finest particles
 - iii) The innermost layer shall preserves the respirator's shape
- 4) It shall have high filtration efficiency against organic vapours and particulate dusts
- 5) It shall have low breathing resistance.
- 6) It shall have the adjustable Head Band made up of suitable material and shall have a very good elastic retention properties.
- 7) It shall have adjustable Aluminum Nose Clip, so as to conform to the nasal contours of the wearer and provides comfort and secured seal.

4.0 Sample

Sample shall be supplied along with offer for approval only for first time supplier and supplies made after 3 years.

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5.0

TEST CERTIFICATE:

5.1

Suppliers shall submit the test certificates along with the bulk supply.
a) Material quality
b) Filtering efficiency
c) Breathing resistance

5.2

Test Certificate shall also indicate the following
a) BHEL PO.No.
b) Batch No. & date

6.0

PACKING:

The respirator shall be supplied with good quality individual polythene cover packed in card board box.

7.0

Marking

a) ISI/ CE mark
b) BHEL logo
c) Supplier identity
d) Date & year of manufacturing

8.0

Inspection

Inspection will be carried out at our works with reference to the acceptable sample and test reports. BHEL will inspect at works where ever required.

9.0

Guarantee Certificate

Guarantee Certificate to be given for any manufacturing defects along with its consignment for free replacement with in six months from the date of receipt at stores.

10.0

Enquiry specification

The PI and Enquiry shall have latest copy of the specification as “Respirator for welding fumes” as per BHEL Corporate standard _____”.



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d) DISPOSABLE PAPER RESPIRATOR (For Dust & Mist)

1.0 Scope

This standard covers the requirement of Disposable Paper Respirator (for Dust & Mist)

2.0 Compliance with Standards

It shall comply with the standards IS:

3.0 Technical Requirement

- 1) It shall be made up of Permacel paper suitable for Dust and Mist disposable type.
- 2) It shall be of Foldable type suitable for use covering nose and mouth.
- 3) It shall be composed of two layers.
 - i) The outermost layer shall filter out the largest dust particles,
 - ii) The innermost shall be composed of electrostatic filter media, which is capable of filtering the finest particles.
- 4) It shall have high filtration efficiency and low breathing resistance.
- 5) It shall have the adjustable Elastic Band and shall have a very good elastic retention properties.
- 6) It shall have adjustable Aluminum Nose Clip, so as to conform to the nasal contours of the wearer and provides comfort and secured seal.

4.0 Sample

Sample shall be supplied along with offer for approval only for first time supplier and supplies made after 3 years.

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5.0 TEST CERTIFICATE:

5.1 Suppliers shall submit the test certificates along with the bulk supply.

- a) Material quality
- b) Filtering efficiency
- c) Breathing resistance

5.2 Test Certificate shall also indicate the following

- a) BHEL PO.No.
- b) Batch No. & date

6.0 PACKING:

The respirator shall be packed, supplied in polythene cover for protection from dust and damage.

7.0 Marking

- a) ISI/ CE mark
- b) BHEL logo
- c) Supplier identity
- d) Date & year of manufacturing

8.0 Inspection

Inspection will be carried out at our works with reference to the acceptable sample and test reports. BHEL will inspect at works wherever required

9.0 Guarantee Certificate

Guarantee Certificate to be given for any manufacturing defects along with its consignment for free replacement with in six months from the date of receipt at stores.

10.0 Enquiry specification

The PI and Enquiry shall have the latest copy of the specification as “Disposable Paper Respirator (for Dust & Mist)” as per BHEL Corporate standard _____”.



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e) CHEMICAL CARTRIDGE FUME RESPIRATOR

1.0 General

This standard covers the requirement of Chemical Cartridge Fume Respirator.

2.0 Compliance with Standards

It shall comply with IS:8522 – 1977 Reaffirmed 1998

3.0 Technical Requirement

- 1) The chemical cartridge fume respirator shall consist of a face piece (full face piece/half piece) held securely in position with head harness, an exhalation valve, inhalation valve, chemical cartridge holder and a chemical cartridge.
- 2) The full face piece shall fit persons of varying facial contours and sizes. The head harness shall hold the face piece firmly and comfortably in position these shall be adjustable .
- 3) A optional particulate filter shall be provided which shall be located on the inhalation side of the cartridge.
- 4) The respirator shall be of soft PVC material, comfortable to wear with adequate sealing on the face of the wearer.
- 5) Replaceable non-return inhalation valve at the mouth and exhalation valves on the sides, an adjustable elastic strap of min 20 mm width shall be provided.

4.0 Sample

Sample shall be supplied along with offer for approval only for first time supplier and supplies made after 3 years.

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5.0 TEST CERTIFICATE:

5.1 Suppliers shall submit the test certificates along with the bulk supply.

- a) Material quality
- b) Filtering efficiency
- c) Breathing resistance

5.2 Test Certificate shall also indicate the following

- a) BHEL PO.No.
- b) Batch No. & date

6.0 PACKING:

The respirator shall be supplied, packed individually for protection from dust and damage.

7.0 Marking

- a) ISI/ CE mark
- b) BHEL logo
- c) Supplier identity
- d) Date & year of manufacturing

8.0 Inspection

Inspection will be carried out at our works with reference to the acceptable sample and test reports. BHEL will inspect at works wherever required.

9.0 Guarantee Certificate

Guarantee Certificate to be given for any manufacturing defects along with its consignment for free replacement with in six months from the date of receipt at stores.

10.0 Enquiry specification

The PI and Enquiry shall have the copy of the specification as “Cartridge Respirator for.....” as per BHEL Corporate standard _____”.



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f) CANISTER GAS MASK

1.0 Scope

This standard covers the requirement of air-purifying respirator canisters and cartridges used to afford respiratory protection against harmful gases, vapours, or particles,

2.0 Compliance with Standards

It shall comply with the standards IS – 8523 – 1977 Reaffirmed 1983

3.0 Technical Requirement

1. It shall be suitable for organic vapours, harmful gases, or particles specified
2. It shall be of canister type and used for purifying air from atmospheres containing harmful contaminants.
3. It shall be consisting of full face piece, breathing tube, canister, canister harness and associated connections.
 - a. Full Face Piece - The full face piece shall fit persons of varying facial contours and sizes or more than one face piece sizes may be provided to fit varying facial contours and sizes.

An inhalation valve(s) or other means shall be provided to prevent exhaled air from adversely affecting the canister. The valve shall be protected against distortion.

An adjustable and replaceable head harness, capable of maintaining tension under all circumstances shall be provided.

An exhalation valve is required and shall be provided with a cover for its protection.

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b. Containers (Canister) - containers shall be provided for storage of each respirator. Each container shall be identified with the appropriate markings. The respirator shall be easily removable from the container. Containers shall be sealed to protect them against moisture or dryness during storage.

c. Breathing Tube - A flexible breathing tube is part of the respirator construction, it shall not restrict free head movement, disturb face piece fit or otherwise interfere with the wearer's activity. It shall not shut off air flow because of kinking or chin or arm pressure.

d. Harness - A front-mounted, back-mounted harness constructed so that it will hold the canister securely' in position against the wearer's body.

4) It shall have high filtration efficiency The maximum gas/vapour concentration, percent by volume, against which these devices may afford protection

5) It shall have low breathing resistance.

6) The canisters are to be properly labelled and coloured in accordance with the standard

4.0 Sample
Sample shall be supplied along with offer for approval only for first time supplier and supplies made after 3 years.

5.0 TEST CERTIFICATE:

5.1 Suppliers shall submit the test certificates along with the bulk supply.

- Material quality
- Filtering efficiency
- Breathing resistance
- Exhalation valve leakage test
- Dust, mist, fumes and smoke test
- Face piece test

5.2 Test Certificate shall also indicate the following

- BHEL PO.No.
- Batch No. & date

6.0 PACKING:

The Canister Gas mask shall be packed supplied individually protection from damage in a box. indicating **Canister for** (Name of atmospheric contaminant)

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7.0

Marking

Face Piece

a) ISI/ CE mark

b) BHEL logo

c) Supplier identity

d) Date & year of manufacturing

Canister

- The canister shall be marked with the following :

a) Name and/or trade-mark of the manufacturer;

b) The colour prescribed in 8318-1977” either on the canister or label on it;

c) Appropriate marking in bold letters as follows :

‘ Canister for

(Name of atmospheric contaminant)

For respiratory protection in atmospheres containing not more than _ by

volume of (Concentration) (Name of atmospheric contaminant)

Do not use in atmospheres containing less than 16 percent oxygen by volume

The month and year in which the canister was filled;

Minimum working life and shelf life;

Instructions for use; and

The ISI Certification Mark.

8.0

Inspection

Inspection will be carried out at our works with reference to the acceptable sample and test reports. BHEL will inspect at works wherever required.

9.0

Guarantee Certificate

Guarantee Certificate to be given for any manufacturing defects along with its consignment for free replacement with in six months from the date of receipt at stores

10.0

Enquiry specification

The PI and Enquiry shall have the latest copy of the specification as “Canister Gas Mask for” as per BHEL Corporate standard _____”.



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g) AIR LINE RESPIRATOR

1.0 Scope

This standard covers the requirement of air line respirator used to afford respiratory protection against harmful gases, vapours, or particles, by supplying air.

2.0 Compliance with Standards

It shall comply with the standards IS 10245 (Part 2) - 1994

3.0 Technical Requirement

1. It shall be suitable for harmful gases where oxygen level is very low.
2. It shall be of Compressed air line apparatus in which the air is supplied from a source of compressed air. This may be of constant flow type or demand valve type.
3. It shall be consisting of full face piece, inhalation & exhalation valve, demand valve, flow control valve, breathing tube, hose, harness and associated connections.
4. The full face piece shall fit persons of varying facial contours and sizes. The head harness shall hold the face piece firmly and comfortably in position these shall be adjustable and not less than 19 mm (nominal) width at the points in contact with the head.
5. The apparatus shall be comfortable, that the wearers show no undue signs of strain attributable to wearing the apparatus.
6. The purity of air to be used shall be not less than 99 percent.
7. It shall have low breathing resistance.

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4.0 Sample
Sample shall be supplied along with offer for approval only for first time supplier and supplies made after 3 years.

5.0 TEST CERTIFICATE:

5.1 Suppliers shall submit the test certificates along with the bulk supply.

- a) Material quality
- b) Air supply efficiency
- c) Breathing resistance
- d) Exhalation valve leakage test
- e) Face piece test

5.2 Test Certificate shall also indicate the following

- a) BHEL PO. No.
- b) Batch No. & date

6.0 PACKING:

The Air line respirator shall be packed supplied individually in a box to give protection from damage

7.0 Marking

- a) ISI/ CE mark
- b) BHEL logo
- c) Supplier identity
- d) Date & year of manufacturing

8.0 Inspection
Inspection will be carried out at our works with reference to the acceptable sample and test reports. BHEL will inspect at works wherever required.

9.0 Guarantee Certificate

Guarantee Certificate to be given for any manufacturing defects along with its consignment for free replacement with in six months from the date of receipt at stores

10.0 Enquiry specification
The PI and Enquiry shall have the latest copy of the specification as “Air line respirator” as per BHEL Corporate standard _____”.



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h) SELF BREATHING APPARATUS

1.0 Scope

This standard covers the requirement of Breathing Apparatus used to afford respiratory protection against harmful gases, vapours, or particles, by supplying air.

2.0 Compliance with Standards

It shall comply with the standards IS 10245 (Part 1)

4.0 Technical Requirement

1. It shall be Closed-circuit breathing apparatus.
2. It shall be used for supplying air /oxygen from compressed air/oxygen cylinder
3. It shall be consisting of Exhalation valve, Inhalation Valve, Full Face piece, Breathing Bag, Relief Valve, Pressure Gauge, Cylinder Valve, Pressure Reducing Valve and associated connections.
4. The full face piece shall fit persons of varying facial contours and sizes. The head harness shall hold the face piece firmly and comfortably in position these shall be adjustable and not less than 19 mm (nominal) width at the points in contact with the head,
5. The apparatus shall be fitted with a warning device, that the wearer is warned immediately if the main valve is closed or if the cylinder fitted is empty.
6. The total volume of oxygen available shall be sufficient to meet an average consumption
7. The breathing bag shall be made of strong, flexible material and shall be protected against collapse of damage by external agencies.
8. The apparatus shall be comfortable, that the wearers show no undue signs of strain attributable to wearing the apparatus.
9. The purity of oxygen to be used shall be not less than 99 percent.
10. It shall be accompanied by operating instructions for maintenance and use which shall include:
 - a) nominal working duration;
 - b) guidance on fit of face piece, and adjustment of face seal where relevant;

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4.0

Sample
Detailed Pamphlets shall be supplied for our approval along with the offer.

5.0

TEST CERTIFICATE:

5.1

Suppliers shall submit the test certificates along with the bulk supply.
a) Material quality
b) Air supply efficiency
c) Lung Simulation
d) Breathing resistance
e) Inward Leakage On Relief Valve
f) Exhalation valve leakage test
g) Face piece test

5.2

Test Certificate shall also indicate the following
a) BHEL PO.No.
b) Batch No. & date

6.0

PACKING:
The whole breathing apparatus shall be covered by a protective casing to protect the breathing bag, regulator, reducing valve and other vital parts of the apparatus against direct blows and falling materials.

7.0

Marking

a) ISI/ CE mark
b) BHEL logo
c) Supplier identity
d) Date & year of manufacturing
e) Class 1 or 2 as appropriate
f) Working duration

8.0

Inspection
Inspection will be carried out at our works with reference to the acceptable sample and test reports. BHEL will inspect at works wherever required.

9.0

Guarantee Certificate
Guarantee Certificate to be given for any manufacturing defects along with its consignment for free replacement with in six months from the date of receipt at stores

10.0

Enquiry specification
The PI and Enquiry shall have the latest copy of the specification as “Self breathing Apparatus” as per BHEL Corporate standard _____”.



ANNEXURE#6
of
Wagon Tippler Package
for

SAGARDIGHI THERMAL POWER PROJECT
1 x 660 MW UNIT NO. 5, PHASE – III
WEST BENGAL POWER DEVELOPMENT CORPORATION LIMITED

Content:

- WBDCL Vendor list



“The Vendor list as included is not exhaustive and prepared from prior experience of WBPDCL. In case of items not covered in the list or if the bidder seeks additional vendor on the items already covered in the list, the same should be done with proper written request for approval from WBPDCL enclosing the vendor credentials. Maximum effort should be exercised to include only such proven vendors who are already registered in the Bidder's Vendor directory and the bidder has prior experience of supply items from such reputed vendors.”

Sl. No.	Item Description	Vendor Name	
1	SEVERE SERVICE CONTROL VALVE. (PRDS & SH/RH ATTEMPERATION APPLICATION)	1	CONTROL COMPONENTS INC
		2	DRESSER VALVE INDIA PVT.LTD.
2.	BFP RECIRCULATION CONTROL VALVE	1	CONTROL COMPONENTS INC
		2	DRESSER VALVE INDIA PVT.LTD.
3.	NORMAL SERVICE CONTROL VALVE	1	MIL CONTROLS LTD.
		2	FISHER SANMAR LTD.
		3	DRESSER VALVE INDIA PVT.LTD.
		4	CONTROL COMPONENTS INC
4.	OIL TRIP VALVES (FUEL OIL SYSTEM)	1	MIL CONTROLS LTD.
		2	KHUME ARMATUREN GMBH
		3	DRESSER VALVE INDIA PVT. LTD.
5.	STEEL GATE / GLOBE / NR VALVES	1	WEIR B.D.K VALVES INDIA PVT. LTD.
		2	KIRLOSKAR BROTHERS LTD.
		3	LEADER VALVES LTD.
		4	KSB VALVES
		5	FOURESS ENGG.INDIA LTD.
		6	VAG VALVES
		7	AUDCO INDIA
		8	DEWARANCE
6.	BALL VALVES	1	FLOW CHEM INDUSTRIES
		2	FISHER SANMAR LIMITED
		3	KIRLOSKAR BROS. LTD.
		4	LEADER VALVES LTD.
		5	KSB VALVES
		6	WEIR B.D.K VALVES INDIA PVT. LTD.
		7	VAG VALVES
7.	CAST IRON GATE /GLOBE/ NR/ SAFETY RELIEF VALVES	1	H.SARKER & COMPANY
		2	G.M.DALUI & SONS PVT.LTD.
		3	KIRLOSKAR BROS. LTD.



Sl. No.	Item Description	Vendor Name	
		4	LEADER VALVES LTD.
		5	VENUS PUMP & ENGG. WORKS
8.	GUN METAL VALVES	1	LEADER VALVES LTD.
		2	SANT VALVES PVT. LTD.
		3	VALTECH INDUSTRIES ,MUMBAI
		4	SURYA VALVES AND INSTRUMENTS MANUFACTURING COMPANY,CHENNAI
		5	VAG VALVES
9	BUTTER FLY VALVES (STEAM SERVICE)	1	FOURESS ENGG.INDIA LTD.
		2	INSTRUMENTATION LTD.
		3	BDK PROCESS CONTL. HUBLI
10.	BUTTER FLY VALVES (WATER SERVICE)	1	WEIR B.D.K VALVES INDIA PVT. LTD.
		2	FOURESS ENGG.INDIA LTD.
		3	INSTRUMENTATION LTD.
		4	LARSEN & TOUBRO LTD.
		5	KIRLOSKAR BROS. LTD.
		6	VENUS PUMP & ENGG. WORKS
		7	TYCO VALVES & CONTROLS INDIA PVT.LTD.
11.	SPRING LOADED BYPASS VALVES	1	WEIR VALVES & CONTROLS M.E.
12.	PLUG VALVES	1	WEIR B.D.K VALVES INDIA PVT. LTD.
		2	FISHER SANMAR LIMITED
		3	LARSEN & TOUBRO LTD
		4	LEADER VALVES LTD.
13.	ANGLE DRAIN VALVES	1	REINEKE MEB-UND REGELTECHNIK GMBH
		2	SEMPELL AG, GERMANY
		3	VELAN INC.,CANADA
14.	AIR RELEASE VALVES	1	H.SARKER & COMPANY
		2	LEADER VALVES LTD.
		3	VENUS PUMP & ENGG. WORKS
		4	G.M.DALUI & SONS PVT.LTD.
15.	DUAL PLATE CHECK VALVES	1	VENUS PUMP & ENGG. WORKS
		2	FLUIDLINEVALVES COMPANY PRIVATE LTD.
		3	SURYA VALVES AND INSTRUMENTS MANUFACTURING COMPANY
		4	CHEMTECH INDUSTRIAL VALVES PVT.



Sl. No.	Item Description	Vendor Name	
			LTD.
		5	ASIAN INDUSTRIAL VALVES & INSTRUMENTS,
16.	FLOAT VALVES	1	H.SARKER & COMPANY
		2	G.M.DALUI & SONS PVT.LTD.
		3	LEADER VALVES LTD.
17.	FUEL OIL PUMPS (POSITIVE DISPLACEMENT PUMPS)	1	TUSHACO PUMPS PVT. LTD.,
		2	ALEKTON ENGG.INDUSTRIES PVT.LTD.
		3	U.T.PUMPS & SYSTEMS (P) LTD.
18.	JACKING OIL PUMPS WITH MOTOR (SCREW TYPE)	1	TUSHACO PUMPS LIMITED
		2	ALLWEILER AG ,GERMANY
19.	AUX. OIL PUMP (AOP) & EMERGENCY OIL PUMP WITH MOTOR (EOP)	1	KSB PUMPS LIMITED
		2	MATHER & PLATT PUMPS
		3	KBL
20	VACUUM PUMPS	1	EDWARDS LIMITED, UK
		2	NI-TECH INC. USA
		3	NASH ELOM INDUSTRIES, GERMANY
21	LUB OIL TRANSFER PUMPS	1	MATZ PUMPS PVT.LTD.
		2	TUSHACO PUMPS PVT.LT
22	CONCRETE VOLUTE PUMP	1	KIRLOSKAR BROS. LTD.
		2	CLYDE UNION PUMPS
		3	FLOWERVE CORPORATION
23.	PUMPS (VERTICAL)	1	KIRLOSKAR BROS. LTD.
		2	KSB PUMPS LTD.
		3	SULZER PUMPS INDIA LTD.
		4	WEIR,UK
		5	WPIL LIMITED
		6	FLOWMORE
24.	PUMPS (HORIZONTAL)	1	KIRLOSKAR BROS. LTD.
		2	MATHER & PLATT PUMPS LTD.
		3	KSB PUMPS LTD.
		4	SULZER PUMPS INDIA LTD.
		5	WEIR,UK
25.	SUMP PUMPS / SUBMERSIBLE PUMPS/ SLUDGE PUMP	1	KISHOR PUMPS PVT.LTD
		2	KIRLOSKAR BROS. LTD.
		3	KSB PUMPS LTD.
		4	SAM TURBO
26.	LUBE OIL PUMPS	1	KSB PUMPS LTD.



Sl. No.	Item Description	Vendor Name	
	(CENTRIFUGAL)FOR TDBFP	2	KIRLOSKAR EBARA, KIRLOSKARWADI
		3	SULZER, MUMBAI.
27.	LUBE OIL PUMPS (SCREW TYPE) FOR TDBFP	1	ALLWEILER, GERMANY
		2	IMO PUMP, USA
		3	TUSHACO, DAMAN
		4	LEISTRITZ (EMPIRE), GERMANY
28.	JACKING OIL PUMP TDBFP	1	TUSHACO, (DELTA CORP)
		2	HAGULLAND DENSION
29.	SCANNER AIR FAN	1	M/S.C.DOCTOR & CO.PVT.LTD.
		2	M/S PATELS AIRFLOW LTD.
		3	M/S.AIR CONTROL & CHEMICAL ENGG. CO.LTD.
30.	FLOW ELEMENTS	1	MICRO PRECISION PRODUCTS
		2	M/S ESPL KOLKATA
		3	IL PALGHAT
31.	OIL PURIFICATION UNIT (OIL CENTRIFUGE)/PORTABLE OIL PURIFIERS	1	PENNWALT LIMITED, INDIA
		2	ALFA LAVAL LIMITED, INDIA
		3	SERVIZE INDUSTRIAL, ITALY
32.	ELECTRICAL HOIST	1	AVON CRANES PVT.LTD.
		2	LIFTING EQUIPMENTS & ACCESSORIES
		3	REVA INDUSTRIES LTD
		4	CONSOLIDATED HOIST PVT LTD
		5	TUOBRO FURGUSON(INDIA)PVT.LTD
		6	HERCULES HOISTS LTD.
		7	DYNAMECH CRANES (P) LTD.
		8	UNIVERSAL HOIST – O- FABRIK
		9	ARMSEL MHE PVT.LTD
33	CHAIN PULLEY BLOCK	1	ARMSEL MHE PVT LTD
		2	LIFTING EQUIPMENT & ACCESPROES
		3	UNIVERSAL HOIS –O-FABRIK
		4	HERCULES HOISTS LTD.
		5	TUOBRO FURGUSON(INDIA)PVT.LTD
34	DOUBLE GIRDER EOT CRANE ABOVE 50T TO 150T (TG/GT HALL & OTHER AREAS)	1	HEAVY ENGG. CORPORATION LTD.
		2	MUKAND LIMITED,
		3	THE TATA IRON & STEEL CO.LTD
		4	UNIQUE INDUSTRIAL HANDLERS PVT.LTD
		5	WMI CRANES LTD.
		6	FURNACE & FOUNDRY EQUIPMENT



Sl. No.	Item Description	Vendor Name	
			CO.
35	DOUBLE GIRDER EOT CRANES UPTO 50T	1	WMI CRANES LTD.
		2	THE TATA IRON & STEEL CO.LTD
		3	UNIQUE INDUSTRIAL HANDLERS PVT.LTD
		4	MUKAND LIMITED,
		5	AVON CRANES PVT.LTD.
		6	REVA INDUSTRIES LTD.
		7	HEAVY ENGG. CORPORATION LTD.
		8	FURNACE & FOUNDRY EQUIPMENT CO.
36	SINGLE GIRDER EOT MISC.CRANES	1	REVA INDUSTRIES LTD.
		2	CONSOLIDATED HOIST PVT LTD
		3	LIFTING EQUIPMENTS & ACCESSORIES
		4	TUOBRO FURGUSON(INDIA)PVT.LTD
37	FURNACE MAINTENANCE PLATFORM	1	N.V.SKY CLIMBER EUROPE S.A
		2	N.V.SKY MAN INTERNATIONAL S.A.
		3	HING WING GONDOLA (HK) CO LTD, HONGKONG
38	ELEVATOR-PASSENGER CUM GOODS	1	KONE ELEVATOR INDIA LTD.
		2	OTIS ELEVATOR
		3	CITY LIFT (I) LTD.
		4	ECE Industries Ltd
39.	CASTABLE REFRACTORY	1	BASKAR REFRACTORIES AND S.W PIPES(P)LTD
		2	THE ACE REFRACTORIES LTD.
		3	DALMIA REFRACTORIES
		4	SOUVENIOR CERAMICS
40.	POURABLE INSULATION	1	BASKAR REFRACTORIES & STONEWARE PIPES(P)LTD
		2	THE ACE REFRACTORIES LTD.
		3	DALMIA REFRACTORIES
41.	FIRE BRICKS	1	BASKAR REFRACTORIES AND STONEWARE PIPES (P) LTD
		2	THE ACE REFRACTORIES LTD.
		3	DALMIA REFRACTORIES
		4	R V REFRACTORIES
42.	WOOL MATTRESS	1	ROCKWOOL INDUSTRIES LTD
		2	MINWOOL ROCK FIBRES LTD
		3	LAPINUS ROCKWOOL PVT. LTD



Sl. No.	Item Description	Vendor Name	
		4	ROCKWOOL INDIA LTD.
		5	LLOYD INSULATION (I) LTD.
		6	LLOYD ROCKFIBRES LTD.
43.	THERMAL INSULATION OF STEAM TURBINE/THERMAL INSULATION OF TURBINE INTEGRAL PIPING/THERMAL INSULATION- ROCKWOOL MATTRESSES/ PIPE SECTIONS	1	LLOYD INSULATIONS
		2	MINWOOL ROCK FIBERS
		3	ROCKWOOL
		4	LAPNNUS ROCKWOOL
44.	THERMAL INSULATION - ANCILLARY MATERIAL	1	LLOYD INSULATIONS (INDIA) LIMITED
		2	SURESH INDUSTRIAL CORPORATION
		3	ALLIED INSULATIONS (INDIA), GHAZIABAD
		4	ENERGY SAVING & ALLIED PRODUCTS
45	STEAM TRAPS	1	PREMIUM ENERGY TRANSMISSION LTD (GREAVES)
		2	SPIRAX MARSHALL PVT.LTD.
		3	PENNANT ENGINEERING PVT.LTD.
		4	LEADER VALVES LTD.
		5	OTOKLIN PLANTS AND EQUIPMENTS
46	AIR TRAPS	1	PENNANT ENGINEERING PVT.LTD.
		2	SPIRAX MARSHALL PVT.LTD.
47	CW TREATMENT PLANT (Items to be procured from the approved Vendor List)	1	CLEAR WATER LTD.
		2	THERMAX LTD.
		3	DRIPLEX WATER ENGG. LTD.
		4	CHEMBOND ASHLAND WATER TECHNOLOGIES LTD.,MUMBAI
		5	VA TEC WABAG LTD
48	GRAVIMETRIC FEEDER	1	STOCK INDIA
		2	MERRICK
49.	PORTABLE FIRE EXTINGUISHERS	1	ALERT FIRE SERVICES
		2	KOOVERJI DEVSHI & CO.PVT.LTD
		3	SAFEX FIRE SERVICES LTD.
		4	VIJAY INDUSTRIES & PROJECTS LTD
		5	ZENITH FIRE SERVICES (INDIA) PVT LTD
		6	NEW ENGINEERING CORPORATION
		7	NITIN FIRE PROTECTION INDUSTRIES LTD



Sl. No.	Item Description	Vendor Name	
		8	KANADIA FYR FYTER PVT.LTD.,
		9	GUNNEBO INDIA LIMITED
50	COMPRESSED AIR SYSTEM	1	ATLAS COPCO (INDIA) LTD.
		2	KOBELCO-KIRLOSKAR PNEUMATIC CO.LTD.
		3	INGERSOLL RAND (INDIA) LTD.
			KBL (only for Reciprocating type)
		4	TOSIBA,JAPAN
51	MILL REJECT SYSTEM (PNEUMATIC) (Items to be procured from the approved Vendor List)	1	MACAWBER BEEKAY PVT.LTD.
		2	DC INDTL.PLANT SERVICES PVT.LTD
		3	UNITED CONVEYOR CORPORATION (INDIA) PVT.LTD.,KOLKATA
52	CHLORINATION PLANT (Items to be procured from the approved Vendor List)	1	IEC FABCHEM LIMITED
		2	PERFECT CHLORO SYSTEMS
		3	CAPITAL CONTROLS INDIA PVT. LTD.
		4	PENWATT INDIA LTD
		5	METITO POLLUTION CONTROL INDIA LTD
53	CHEM. DOSING PLANT	1	MILTON ROY INDIA (P) LTD.
		2	SWELORE ENGG.PVT.LTD
		3	V.K.PUMP INDUSTRIES PVT.LTD.
		4	TECHNO CONSULTANTS
		5	PSI ENGINEERING SYSTEMS (P) LTD.,CHENNAI
		6	ENPRO INDUSTRIES PVT.LTD.,PUNE
54	CONDENSATE POLISHING UNIT (Items to be procured from the approved Vendor List)	1	DRIPLEX WATER ENGG. LTD.
		2	THERMAX
		3	ION EXCHANGE (INDIA) LTD
		4	VA TEC WABAG LTD, INDIA.
		5	BGR ENERGY SYSTEMS
55	COLTCS / SCS/DEBRIS FILTER (Items to be procured from the approved Vendor List)	1	TECHNOS, FRANCE
		2	GEA BGR ENERGY SYSTEM INDIA LTD.
		3	MULTITEX FILTRATION ENGINEERS LTD.
		4	FILTRATION ENGINEERS LTD.
		5	EIMCO WATER TECHNOLOGIES ,LLC, USA
		6	TAPROGGE GmbH
		7	KLUMP & KOLLER GmbH



Sl. No.	Item Description	Vendor Name	
56	ALUMINIUM SHEETS/ COILS	1	BHARAT ALUMINIUM CO.LTD.
		2	INDIAN ALUMINIUM CO.LTD.
		3	HINDALCO INDUSTRIES LTD.
		4	NATIONAL ALUMINIUM COMPANY LTD.
57	HOC TYPE GAS DRIER	1	DELAIR INDIA PVT. LTD.
		2	ATLAS COPCO (INDIA) LTD.
58	REFRIGERATION TYPE GAS DRIER	1	DELAIR INDIA PVT. LTD.
		2	SUMMIT
		3	SAVRO
59	HP BYPASS SYSTEM.	1	SULZER-CCI AG, SWITZERLAND
60	LP BYPASS SYSTEM.	1	SULZER-CCI AG, SWITZERLAND
		2	BOMABA, GERMANY
		3	WELLAND & TUXHORN, GERMANY
61	MISC. TANKS (SHOP)	1	GENERAL MECHANICAL WORKS
		2	UNITECH MACHINES LTD.
		3	TECHNO ELECTRIC & ENGG. CO. LTD.
		4	THERMOPADS PVT LIMITED
		5	VIJAY TANKS & VESSELS LTD
62.	FLAME ARRESTOR (MISCELLANEOUS TANKS)	1	PROCESS INSTRUMENTS
		2	ASIAN INDUSTRIAL VALVES
		3	ACCOUSTICS INDIA PVT. LTD.
		4	MULTITEX FILTERS PVT. LTD.
63	M.E. BELLOWS	1	FLUIDINE ENGRS.INDIA PVT.LTD
		2	EXPANSION JOINT SYSTEMS INC. USA
		3	MUNRO & MILLER FITTINGS LTD., U.K
		4	SENIOR FLEXONICS, U.K.
		5	SUR INDUSTRIES PVT.LTD.,KOLKATA
		6	CORBIS
64	HEAT EXCHANGERS (PLATE TYPE)	1	ALFA LAVAL (INDIA) LTD.
		2	GEA ECOFLEX INDIA PVT LTD
		3	TRANSTER INDIA PRIVATE LIMITED
		4	L&T
65	JOURNAL BEARING BFP & BP/THRUST CUM JOURNAL BEARING FOR CEP/THRUST BEARING (BFP & BP)	1	COLHERENE, UK
		2	WAUKESHA BEARINGS (GLACIER), UK
		3	KINGSBURY, USA
		4	MITCHELL, UK
66.	HYDRAULIC COUPLING	1	VOITH TURBO PVT LTD



Sl. No.	Item Description	Vendor Name	
67.	DISCONNECTING COUPLING FOR TDBFP	1	ZURN INC, USA
68.	SUCTION STRAINERS (BFP, BP & CEP)	1	OTOKLIN
		2	MULTITEX
		3	GUJARATH OTOFILT
69.	MECHANICAL SEAL (BFP/BP & CEP)	1	BURGMANN, GERMANY.
		2	EAGLE POONAWALA LTD.PUNE
		3	FLOWERVE SANMAR, CHENNAI
70	CONNECTING COUPLING FOR MD BFP SET & CEP	1	FLEXIBOX LTD., UK
		2	TURBOFLEX, UK
		3	BIBBY TURBOFLEX (FORMERLY EUROFLEX), UK
		4	EUROFLEX TRANSMISSION LTD., HYDERABAD.
71	CONNECTING COUPLING (MEMBRANE TYPE/GEAR TYPE) FOR TDBFP	1	EUROFLEX TRANSMISSION, HYDERABAD.
		2	RENK AG,GERMANY
		3	JOHN CRANE, UK
		4	KOPFLEX, USA
		5	BIBBY TURBOFLEX (FORMERLY EUROFLEX), UK
		6	AMERIDRIVES (ZURN), USA
		7	LUFKIN, USA/FRANCE
		8	BHS, GERMANY
		9	FLENDER GRAFFENSTADEN, FRANCE
74	GEAR BOX FOR TDBFP	1	WALCHAND NAGAR, PUNE
		2	RENK AG,GERMANY
		3	LUFKIN, USA/FRANCE
		4	FLENDER GRAFFENSTADEN, FRANCE
		5	BHS, GERMANY
75.	BARE RUBBER BELLOWS	1	CORI ENGINEERS PVT. LTD CHENNAI.
		2	SRM ESOFLEX PVT. LTD. KOLKATTA
		3	CORBIS
76.	SPRING SUPPORTS / HANGERS	1	SARATHI ENGG. ENTERPRISES PVT. LTD.
		2	HYDERABAD PIPING & ENERGY PRODUCTS (P) LTD. NEW DELHI
		3	SHAPE BAHADARABAD
		4	DARSHANI-INDIA
		5	PAL ENGINEERING YAMUNANAGAR
77.	SELF LUBRICATING BEARING	1	TEN MAT LTD UK



Sl. No.	Item Description	Vendor Name	
	TUBES FOR BF VALVES	2	(FEROFORM T 814 TUBES)
		3	THORDON
		4	THORPLAS TUBES, CANADA
78	FLUIDIZING AIR HEATER	1	ESCORTS
		2	SPHEREHOT
		3	RAYCOLD
		4	INDURE PVT. LTD.
79	ALLOY C.I. FITTINGS & LINERS	1	MENON METALLIKS
		2	CRAWLEY & RAY
		3	SAM CASTINGS
		4	CRESENT
80	ASH SLURRY PUMP/ BA OVERFLOW PUMP	1	SAM TURBO
		2	INDURE PVT. LTD.
81	KNIFE GATE VALVES	1	VAAS
		2	SISTAG, SWITZERLAND
		3	TYCO, USA
		4	VELAN, UK/USA
		5	INDURE PVT. LTD.
		6	ORBINOX INDIA (P) LTD.
82	MS AND GI PIPES	1	SAIL
		2	JINDAL
		3	INDUS TUBES
		4	SURYA ROSHNI
		5	TATA
83	STAINLESS STEEL PIPES	1	RATNAMANI METAL & TUBES
84	BASALT LINED PIPES AND FITTINGS	1	INDURE PVT. LTD.
		2	DEMECH
		3	ENVIRO ABRASION
85	MS ERW PIPES (SLURRY DUTY)	1	SAIL
		2	JINDAL
		3	JCO GAS PIPES
		4	TATA
86	TWIN LOBE TYPE ROTARY FLUDIZING AIR BLOWER	1	SWAM PNEUMATICS
		2	KAY INTERNATIONAL
		3	EVEREST
87	VACUUM PUMP / MECHANICAL EXHAUSTER (LIQUID RING TYPE)	1	KAKATI KARSHAK
		2	VACUNAIR
		3	GARDNER DENVER,KOREA
88	CRUSHER	1	THYSSENKRUPP.



Sl. No.	Item Description	Vendor Name	
		2	MCNALLY BHARAT ENGG. CO. LTD.
		3	LARSEN & TOUBRO
		4	ELECON ENGINEERING CO. LTD
		5	TRF LIMITED
89	APRON FEEDER	1	THYSSENKRUPP
		2	LARSEN & TOUBRO
		3	ELECON ENGINEERING CO. LTD.
		4	TRF LIMITED
		5	FL SMITH
		6	METSO
		7	MCNALLY BHARAT ENGG. CO. LTD
90	BELT VULCANIZER	1	SHAW ALMEX
		2	NILOS
		3	S. V. DATTAR
91	CONVEYOR BELT	1	SEMPERTRANS NIRLON, MUMBAI
		2	JONSON RUBBER
		3	PHONIX YULE, KOLKATA
		4	HILTON-FORECH
		5	MRF
		6	YOKOHAMA
92	ROLLER SCREEN	1	MSEL
		2	THYSSENKRUPP.
		3	ELECON ENGINEERING CO. LTD
92	REDUCTION GEAR BOX (Coal Handling Plant Only)	1	PREMIUM ENERGY TRANSMISSION
		2	FLENDER LIMITED
		3	ELECON ENGINEERING CO. LTD.
93	FLUID COUPLING (Coal Handling Plant Only)	1	VOITH
		2	PREMIUM ENERGY TRANSMISSION
		3	FLUIDOMAT
94	FLEXIBLE GEAR COUPLING	1	ELECON ENGINEERING CO. LTD.
		2	FENNER
		3	WELLMAN
		4	CONCORD
		5	GMB MFG. (P) LTD., KOLKATA
		6	HI-CLIFF
		7	LOVEJOY
95	BELT CLEANERS (SPRUNG TYPE) / MODULAR TYPE SKIRT	1	HOSCH EQUIPMENT, KOLKATA
		2	TRF
		3	CORBID ENGINEERING, MUMBAI



Sl. No.	Item Description	Vendor Name	
	SEALING	4	MASYC PROJECT PVT LTD.
		5	HYQUIP LTD, HYDERABAD.
96	THRUSTER BRAKE	1	BENGAL TECHNOCRAT
		2	WITTON KRAMER
		3	STROM CRAFT
97	BELT WEIGHER	1	INDUSTRIES SYNDICATE
		2	PBL
		3	TRANSWEIGH
		4	IPA
		5	SHENEICK PROCESS
98	TRAVELLING TRIPPER	1	MSEL
		2	BENGAL TOOLS
		3	HMTC
99	IN-LINE MAGNETIC SEPARATOR / SUSPENDED MAGNET	1	ELECTRO-ZAVOD
		2	PBL
		3	ELECTROMAGNETIC INDUSTRIES
100	ELECTRONIC METAL DETECTOR	1	ELECTROMAG DEVICES LTD., MUMBAI
		2	M. R. EQUIPMENT
		3	POWER BUILD, VALLABH VIDYANAGAR
101	CONVEYOR PULLEYS	1	BENGAL TOOLS
		2	MCNALLY BHARAT ENGG. CO. LTD.
		3	ELECON
		4	ARUDRA
102	CONVEYOR IDLERS	1	ELECON ENGINEERING CO. LTD.
		2	ARUDRA
		3	TRF LIMITED
		4	MCNALLY BHARAT, ENGG. CO. LTD.
		5	TEGA
		6	BENGAL TOOLS.
103	CENTRIFUGAL FANS (DE System)	1	ABB
		2	FLAKT INDIA
		3	TOURBOVANT
		4	APC
		5	DUSTVEN
104	VIBRATION ISOLATION	1	GERB
105	IDLER BEARING	1	FAG
		2	SKF
		3	HKT



Sl. No.	Item Description	Vendor Name	
		4	TATA TIMKEN
		5	ZKL
		6	KOYO
		7	NBC
106	RAIL CLAMP	1	SILVERLINE INTERNATIONAL.
		2	TECONNEX
107	PULLEY BEARING (SPLIT TYPE)	1	FAG
		2	SKF
		3	HKT
		4	COOPER
108	SELF ALIGNMENT (CARRIER & RETURN) ROLLER	1	TEGA.
		2	TRF LIMITED
109	RAIL	1	SAIL
		2	TATA
110	DUST EXTRACTION SYSTEM	1	THERMEX
		2	F. HARLEY
		3	TPS,DELHI
		4	SPRAYING SYSTEM , BANGALORE
111	DUST SUPPRESSION SYSTEM	1	KAVERI ULTRA POLYMER LTD.
		2	F. HARLEY
		3	TPS,DELHI
112	COAL SAMPLING UNIT	1	SUNRISE
		2	EASTMAN CRUSHER
113	ADOPTOR SLEEVE	1	SKF.
		2	BENGAL TOOLS
114	ENERGY CHAIN	1	IGUS
115	HYDRAULIC DRIVE FOR BELT CONVEYORS	2	HAGGLUNDS
116	BUNKER SEALING BELT	1	SYNERGY KOLKATA
		2	DHANVANTHRI ENGINEERS PVT. LTD.
		3	ALEX CONVEYOR
		4	MESTO
117	STRAINER	1	STRAINWELL INDIA
		2	ACME FLUID SYSTEMS
		3	SRK STRAINERS & VALVES INDIA
118	ROCK BREAKER AND GRABBER	1	JEHEL
		2	NAKODA MACHINERY
		3	MCQUAID ENGINEERING
		4	JCB INDIA LTD.



Sl. No.	Item Description	Vendor Name	
119	RACK AND PINION GATE	1	BENGAL TOOL
		2	MSEL
		3	HMTC
		4	DA ENGG.
120	FLAP GATE	1	DA ENGG.
		2	MERIT CHENNI
		3	MMHE
		4	MSE
121	LINER PLATE	1	SAIL
		2	TATA STEEL
122	TECHNOLOGICAL STRUCTURE MATERIAL	1	SAIL
		2	TATA STEEL
		3	ZINDAL
123	HOPPER CHUTE, SKIRT BOARD WITH SUPPORTING STRUCTURE	1	MSEL
		2	HMTC
		3	MMHE
124	REVERSIBLE BELT CONVEYOR	1	DHANVANTHRI ENGINEERS PVT. LTD.
		2	ALEX CONVEYOR
		3	MESTO
		4	LA MINING
	ELECTRICAL SYSTEM VENDORS		
1	HT SWITCHGEAR (11KV, 3.3 KV)	1	
		2	AREVA LTD.
		3	BHEL.
		4	SIEMENS LTD
2	PMCC, PCC & MCC	1	AREVA LTD.
		2	LARSEN & TOUBRO LTD.
		3	SIEMENS LTD
		4	SCHNEIDER
		5	ABB
3	AIR CIRCUIT BREAKER	1	AREVA LTD.
		2	LARSEN & TOUBRO LTD.
		3	SIEMENS LTD (3WL model only)
		4	SCHNEIDER
		5	ABB
4	AC CONTACTOR / AUX. CONTACTOR	1	L&T
		2	SIEMENS LTD



Sl. No.	Item Description	Vendor Name	
		3	SCHNEIDER
		4	ABB
		5	GE Power
5	AMMETER (INDICATING)	1	AUTOMATIC ELECTRIC
		2	IMP
		3	RISHABH INDUSTRIAL (L&T)
6	BREAKER CONTROL SWITCH/ SELECTOR SWITCH	1	KAYCEE
		2	ALSTOM LTD.
		3	GE – POWER
		4	SALZER, L&T
7	CURRENT TRANSFORMER	1	KAPPA ELECTRICALS
		2	PRAGATI ELECTRICALS
		3	PRAYOG
		4	SILKAANS
		5	PRECISE ELECTRICS
		6	SOUTHERN ELECTRICS
		7	SIEMENS
		8	AUTOMATIC ELECTRIC
		9	INDCOIL
8	CONTROL TRANSFORMERS	1	KAPPA ELECTRICALS
		2	SILKAANS
		3	SOUTHERN ELECTRICS
		4	PRECISE ELECTRICALS
		5	AUTOMATIC ELECTRIC
		6	INDCOIL
9	VOLTAGE TRANSFORMERS (VT)	1	INDCOIL
		2	KAPPA ELECTRICALS
		3	PRAGATI ELECTRICALS
		4	PRAYOG
		5	PRECISE ELECTRICS
		6	SILKAANS
		7	SOUTHERN ELECTRICS
		8	AUTOMATIC ELECTRIC
		9	SIEMENS
10	ACDB, DCDB, AC/DC FUSE BD, MLDB, ELDB, PDB, WELDING DB, VENTILATION DB	1	SCHNEIDER
		2	L&T
		3	SIEMENS
		4	GE – POWER
		5	ABB



Sl. No.	Item Description	Vendor Name	
11	OIL FILLED TRANSFORMER (More than 10 MVA)	1	BHEL
		2	GE
		3	AREVA T & D INDIA LIMITED
		4	FUJI
		5	ABB
		6	ALSTOM
12	OLTC	1	BHEL
		2	CTR
		3	MASCHINENFABRIK REINHAUSEN(MR)
13	OIL FILLED TRANSFORMER (Less than 10MVA)	1	CROMPTON GREAVES LTD.
		2	GE
		3	AREVA T & D INDIA LIMITED NAINI
		4	FUJI
		5	ABB
		6	ALSTOM
		7	KIRLOSKAR ELECTRIC CO. LTD.
		8	VOLTAMP TRANSFORMER LTD.
		9	ANDREW YULE & COMPANY LTD.
		10	BHEL
		11	SUDHIR TRANSFORMER
14	ELECTRONIC MOTOR PROTECTION RELAY (EMPR) INCLUDING EOGR	1	AREVA
		2	SIEMENS
		3	L&T
		4	GE – POWER
		5	SCHNEIDER
15	ENERGY METER	1	SECURE METERS (SEMS)
		2	SCHNEIDER CONZERVE
		3	L&T
16	FUSES ALONG WITH FUSE BASE	1	L&T
		2	ALSTOM LTD.
		3	SIEMENS
		4	SCHNEIDER
		5	ABB
17	ISOLATING SWITCH	1	SALZER, L&T
		2	SIEMENS
		3	ALSTOM LTD.
		4	GE – POWER
		5	SCHNEIDER



Sl. No.	Item Description	Vendor Name	
		6	ABB
		7	KAYCEE
18	INTERPOSING RELAYS	1	JYOTI
		2	OEN
		3	ABB
		4	ELESTA
19	INDICATING LAMP (LED)	1	SIEMENS
		2	VAISHNO
		3	L&T
		4	ALSTOM LTD.
		5	BCH
		6	GE – POWER
		7	SCHNEIDER
		8	CONCORD
		9	TECKNIC CONTROLS
		10	ABB
		11	ESSEN DEINKI
20	NON SEGREGATED PHASE BUS DUCTS	1	M/S KGS Engineering Limited
		2	L&T
		3	SIEMENS
		4	ALSTOM LTD.
		5	BEST & CROMPTON
21	LPBS (NON-FLAME PROOF)	1	L&T
		2	SCHNEIDER
		3	SIEMENS
22	LPBS(FLAME PROOF)	1	BALLIGA
		2	EX-PROTECTA
23	LOCAL MOTOR STARTER	1	L&T
		2	TELEMACHANIQUE (SCHNEIDER)
		3	SIEMENS
		4	ABB
		5	GE – POWER
24	MCCB(AC)	1	L&T
		2	GE – POWER
		3	SIEMENS
		4	SCHNEIDER
		5	ABB.
25	MCCB(DC)	1	L&T
		2	GE – POWER



Sl. No.	Item Description	Vendor Name	
		3	SIEMENS
		4	SCHNEIDER
		5	ABB.
26	MULTIFUNCTION METER	1	SECURE METERS (SEMS)
		2	SCHNEIDER CONZERVE
27	MINIATURE CIRCUIT BREAKER (MCB)	1	SCHNEIDER
		2	L&T
		3	SIEMENS
		4	ABB
28	MOTOR PROTECTION CIRCUIT BREAKER (MPCB)	1	AREVA
		2	SIEMENS
		3	L&T
		4	SCHNEIDER
		5	ABB.
29	NGR	1	RESITECH
		2	S. R. NARKHEDE
		3	RSI SWITCHGEAR
30	NUMERICAL RELAY	1	ABB
		2	AREVA MICOM
		3	SIEMENS (SIPROTEC)
		4	GE – POWER
		5	SCHNEIDER MICOM
		6	ALSTOM MICOM
31	SYNCHROSCOPE	1	AUTOMATIC ELECTRIC
		2	GEC - ALSTHOM
32	SWITCH & SOCKET (INDUSTRIAL TYPE)	1	CROMPTON GREAVES
		2	BCH
		3	ANCHOR
		4	BEST & CROMPTON
		5	ABB
33	SPACE HEATER	1	C&S ELECTRIC
		2	SPACEAGE
34	TRANSDUCER	1	AUTOMATIC ELECTRIC LTD.
		2	ELSTER
		3	SOUTHERN TRANSDUCERS
		4	CAMILLE BAUER, GERMANY
35	THERMAL OVERLOAD RELAY	1	L&T
		2	SIEMENS
		3	SCHNEIDER



Sl. No.	Item Description	Vendor Name	
		4	GE – POWER
		5	ABB
36	TIMER	1	BCH
		2	ALSTOM
		3	L&T
		4	SCHNEIDER
		5	ABB
37	TERMINALS BLOCK (FIXED / DRAW OUT)	1	PHOENIX
		2	CONNECT WELL
		3	ELEMEX
		4	WAGO
		5	ESSEN DEINKI
38	VOLTMETER (INDICATING)	1	AUTOMATIC ELECTRIC
		2	IMP
		3	RISHABH INDUSTRIAL (L&T)
39	LT PVC CONTROL CABLES	1	CABLE CORPORATION OF INDIA
		2	CORDS CABLE INDUSTRIES LTD
		3	DELTON CABLES LTD.
		4	KEC
		5	CRYSTAL CABLE INDUSTRIES LTD.
		6	KEI INDUSTRIES LTD.
		7	NICCO CORPORATION LTD.
		8	POLYCAB WIRES PVT.LTD
		9	TORRENT CABLES LTD.
		10	UNIVERSAL CABLES D.
		11	RPG
40	LT XLPE POWER CABLES	1	CABLE CORPORATION OF INDIA
		2	HINDUSTHAN VIDYUT PRODUCTS
		3	KEC INTERNATIONAL
		4	TORRENT CABLES LTD.
		5	UNIVERSAL CABLES LTD.
		6	POLYCAB WIRES PVT.LTD
		7	KEI INDUSTRIES LTD.
		8	NICCO
		9	CRYSTAL CABLE INDUSTRIES LTD.
41	LT PVC POWER CABLES	1	CORDS CABLE INDUSTRIES LTD
		2	CRYSTAL CABLE INDUSTRIES LTD.
		3	HINDUSTHAN VIDYUT PRODUCTS
		4	KEI INDUSTRIES LTD.



Sl. No.	Item Description	Vendor Name	
		5	NICCO CORPORATION LTD.
		6	POLYCAB WIRES PVT.LTD
		7	TORRENT CABLES LTD.
		8	UNIVERSAL CABLES LTD.
		9	CABLE CORPORATION OF INDIA
42	HT XLPE POWER CABLES	1	CABLE CORPORATION OF INDIA
		2	KEI INDUSTRIES LTD.
		3	HINDUSTHAN VIDYUT PRODUCTS
		4	NICCO CORPORATION LTD.
		5	UNIVERSAL CABLES LTD.
43	SCREENED CONTROL CABLES	1	DELTON CABLES LTD.
		2	KEI INDUSTRIES LTD.
		3	NICCO CORPORATION LTD.
		4	POLYCAB WIRES PVT.LTD
		5	CORDS CABLE INDUSTRIES LTD
		6	THERMO CABLES
44	220V DC LEAD ACID BATTERIES (TUBULAR AND PLANTE)	1	EXIDE INDUSTRIES LTD
		2	HOPPECKE, GERMANY / MALAYSIA
45	NICKEL – CADMIUM BATTERY	1	HBL POWER SYSTEMS, HYDERABAD
46	220V DC BATTERY CHARGER (More than 100 AH)	1	CHLORIDE POWER SYSTEMS & SOLUTIONS LTD
		2	STATCON POWER LTD.
		3	HBL POWER SYSTEMS LTD
47	220V DC BATTERY CHARGER (Upto 100 AH)	1	CHHABI ELECTRICALS PVT. LTD.
		2	AMARA RAJA POWER SYSTEMS PVT. LTD
		3	CHLORIDE POWER SYSTEMS & SOLUTIONS LTD
		4	STATCON POWER LTD.
		5	HBL POWER SYSTEMS LTD
48	TRANSFORMER (DRY TYPE)	1	VOLTAMP
		2	BHARAT BIJLEE
		3	AREVA
		4	CGL
		5	SUDHIR TRANSFORMER
		6	BHEL
49a	HT MOTORS (above 500 kW)	1	ABB
		2	BHEL
		3	SIEMENS



Sl. No.	Item Description	Vendor Name	
49b	HT MOTORS (upto 500 kW)	1	ABB
		2	BHEL
		3	SIEMENS
		4	CROMPTON GREAVES
		5	MARATHON
50	LT MOTORS	1	ABB
		2	SIEMENS
		3	CROMPTON GREAVES
		4	KIRLOSKAR
		5	BHARAT BIJLEE
		6	MARATHON
51	LIGHTING SYSTEM	1	BAJAJ ELECTRICALS LTD.
		2	CROMPTON GREAVES LTD.
		3	PHILIPS INDIA LTD.
52	LIGHTING MAST, LIGHTING TOWER	1	CGL
		2	BAJAJ
		3	PHLLIPS
53	LIGHT FITTINGS	1	BAJAJ
		2	PHLLIPS
		3	CGL
54	CABLE TERMINATION & JOINTING KITS	1	RAYCHEM RPG LIMITED,MUMBAI
		2	3M ELECTRO & COMMUNICATION
55	CABLE TRAYS & ACCESSORIES	1	JAMNA METAL COMPANY
		2	UNITECH FABRICATORS & ENGINEERS
		3	PATNY SYSTEMS (P) LTD.
		4	RATAN PROJECTS & ENGINEERING CO. PVT.LTD.
		5	INDUSTRIAL PERFORATION (INDIA) PRIVATE LIMITED.
		6	RABI ENGINEERING WORKS ,
		7	PREMIER POWER PRODUCTS PVT.LTD.
		8	PARMAR METAL PVT. LTD.
56	CABLE TRAYS SUPPORT SYSTEM WELDED TYPE (HOT DIP GALVANIZED)	1	JAMNA METAL COMPANY
		2	INDUSTRIAL PERFORATION (INDIA) PRIVATE LIMITED.
		3	PATNY SYSTEMS (P) LTD.
		4	RATAN PROJECTS & ENGINEERING CO. PVT.LTD.
		5	RABI ENGINEERING WORKS



Sl. No.	Item Description	Vendor Name	
		6	UNITECH FABRICATORS & ENGINEERS PVT.LTD.
57	TREFOIL CLAMPS	1	MOULDED FIBRE GLASS PRODUCTS
		2	ELECTROMAC INDUSTRIES
		3	SUMIP COMPOSITES PVT.LTD.
		4	AJMERA INDUSTRIAL & ENGINEERING WORKS
58	ABOVE GROUND EARTHING MATERIALS, GS FLAT, MATERIAL FOR LIGHTNING PROTECTION	1	RATAN PROJECTS &ENGINEERING CO. PVT.LTD.
		2	RABI ENGINEERING WORKS
		3	UNITECH FABRICATORS & ENGINEERS PVT.LTD.
		4	INDUSTRIAL PERFORATION (INDIA) PRIVATE LIMITED.
		5	JAMNA METAL COMPANY
		6	PATNY SYSTEMS (P) LTD.
59	MS ROD FOR BELOW GROUND EARTHING	1	STEEL AUTHORITY OF INDIA LIMITED
		2	RASHTRIYA ISPAT NIGAM LIMITED
60	400 kV DISC INSULATOR/ LONG ROD INSULATOR (120KN)/ BUS POST INSULATOR (For Switchyard)	1	BHEL
		2	NGK BIRLA, JAYASHREE
		3	W.S
		4	INDIAN POTTERIES
		5	SARBHANA
61	INSULATOR HARDWARE	1	EMC
		2	ITPPL
		3	TYCO
		4	Tag Corporation, Chennai
		5	IAC
		6	ELECTROMECH & TRANSTECH
62	CLAMPS & CONNECTOR	1	KLEMMEN
		2	UTSAV
		3	TYCO
		4	IAC
		5	MEGHNA
		6	ELECTROMECH & TRANSTECH
63	400 kV SF6 BREAKERS	1	ABB
		2	CGL
		3	SIEMENS
		4	AREVA T&D
64	400 kV SWITCHYARD CT	1	ABB
		2	CGL



Sl. No.	Item Description	Vendor Name	
65	400 kV SWITCHYARD PT	3	ALSTOM
		4	SIEMENS
		1	ABB
		2	CGL
		3	SIEMENS
66	400 kV ISOLATOR	4	ALSTOM
		5	BHEL
67	400 kV EARTH SWITCH	1	SIEMENS
		2	ABB
68	400 KV STRUCTURE	1	GOOD LUCK STEEL TUBES LTD., BULANDSHAHAH (UP)
		2	UTKARSH TUBES AND PIPES LIMITED, KOLKATA, WEST BENGAL
69	400 kV LIGHTNING ARRESTER	1	CGL
		2	ELPRO INTERNATIONAL LIMITED, PUNE
		3	ALSTOM
		4	OBLUM ELECTRICAL INDUSTRIES PVT.LTD., HYDERABAD
70	LIGHTING POLE	1	BOMBAY TUBE & POLES CO..
		2	BAJAJ ELECTRICALS LTD.
71	SEGREGATED PHASE BUSDUCTS	1	M/S KGS Engineering Limited
		2	L&T
		3	SIEMENS
		4	ALSTOM LTD.
		5	BEST & CROMPTON
		6	BHEL
72	ISOLATED PHASE BUS-DUCT	1	BHEL
		2	SIMELECTRO, FRANCE
73	SURGE ARRESTOR (Less than 15 kV)	1	ELPRO
		2	CGL
		3	OBLUM
74	POST INSULATORS	1	BHEL
		2	ADITYA BIRLA INSULATORS
		3	MOULDED FIBRE GLASS PRODUCTS
		4	W.S. INDUSTRIES LTD,CHENNAI
75	DISK/PIN INSULATOR	1	BHEL
		2	ADITYA BIRLA INSULATORS



Sl. No.	Item Description	Vendor Name	
		3	IEC
76	MOOSE CONDUCTOR	1	HINDUSTAN VIDYUT PRODUCTS LTD., HARYANA
		2	GUPTA POWER INFRASTRUCTURE LTD., BHUBANESWAR
		3	HIREN ALUMINIUM Ltd., SILVASSA DADRA & NAGAR HAVELI
77	ALUMINIUM TUBE	1	HINDALCO INDUSTRIES LIMITED
		2	JINDAL ALUMINIUM LIMITED
		3	BALCO
78	STRUCTURE HARDWARE	1	DEEPAK FASTNERS LTD
		2	NAVEEN METAL INDUSTRIES, KOLKATA
		3	NEW INDIA ENGINEERING CORPORATION
79	LUGS	1	UNIVERSAL MACHINES
		2	COMET
		3	MAHAVEER ENGINEERING
		4	DOWELLS
		5	SUNIL & CO. PVT. LTD.
80	FAST BUST TRANSFER	1	AARTECH SOLONICS LTD, MP
		2	ABB
81	RAIL POLE	1	SAIL
		2	RINL
		3	TATA
82	FRP JUNCTION BOXES/ JUNCTION BOXES (POWER/CONTROL), LIGHTING JB	1	SCHNEIDER
		2	CONTROL DEVICE
		3	SWITCHING CIRCUIT
		4	JASPER ENGINEERS
		5	BAJAJ ELECTRICALS
		6	AJMERA
		7	S B EIEC. EENGINEERING CORP. Ltd
		8	PYROTECH
		9	ENGG. CONSTRUCTION CORP.
		10	L&T
83	LOCAL STARTER PANEL, LOCAL CONTROL PANEL, LIGHTING PANEL, ACELP, DCELP	1	PYROTECH
		2	L&T
		3	CONTROL DEVICE
		4	SCHNEIDER
84	LIGHTING WIRE	1	ISI MARK



Sl. No.	Item Description	Vendor Name	
85	ACTUATOR	1	AUMA
		2	LIMITORQUE
86	CABLE for ROLLED -E-CHAIN	1	IGUS
87	CABLE GLAND	1	SUNIL & COMPANY
		2	ARUP ENGG. & FOUNDRY WORKS
		3	COMMET BRASS PRODUCTS
		4	ELECTROMAC INDUSTRIES
		5	BALIGA LIGHTING EQPT.
88	BAY CONTROL UNIT	1	ALSTOM
		2	SIEMENS
		3	ABB
89	TRANSFORMER BUSHING	1	ABB
		2	AREVA
		3	ALSTOM
		4	BHEL
90	EARTH LEAKAGE CB	1	SCHNEIDER
		2	L&T
		3	SIEMENS
		4	ABB
91	EARTH LEAKAGE RELAY [ELR] ALONG WITH CBCT	1	AREVA
		2	PRO'KDEVICES
92	PUSH BUTTON	1	BCH
		2	L&T
		3	SCHNEIDER
		4	SIEMENS
		5	TECKNIC CONTROL
		6	GE – POWER
		7	ABB
93	RELAYS (OTHER THAN INTERPOSING & NUMERICAL RELAYS)	1	ABB
		2	AREVA
		3	SIEMENS
		4	GE – POWER
		5	ALSTOM
94	ENERGY MANAGEMENT SYSTEM	1	SCHNEIDER
		2	SECURE



Sl. No.	Item Description	Vendor Name	
	CONTROL & INSTRUMENTATION SYSTEM VENDORS		
1	DISTRIBUTED CONTROL SYSTEM	1	ABB
		2	HONEYWELL
		3	EMERSON
		4	VALMET (FORMERLY METSO)
2	PLC (Programmable Logic Controller)	1	ROCKWELL AUTOMATION INDIA LTD.
		2	GE
		3	SCHNEIDER ELECTRIC INDIA PVT.LTD.
3	DIGITAL INDICATOR	1	ABB
		2	GOSSEN / CAMILLE BAUER / METRAWATT
		3	YOKOGAWA
4	VERTICAL MOVING COIL INDICATOR	1	ABB
		2	GOSSEN
		3	CAMILLE BAUER
		4	METRAWATT
		5	YOKOGAWA
5	TRANSDUCERS	1	SIEMENS
		2	ABB
		3	CAMILLEBAUER
		4	ELSTER
		5	PYROTECH
		6	SOUTHERN TRANSDUCERS
		7	ADEPT
6	LARGE VIDEO SCREEN	1	BARCO
		2	PLANAR
7	PC	1	DELL
8	TFT MONITOR	1	DELL
		2	HP
		3	IBM-LENOVO
9	DOT MATRIX PRINTERS	1	EPSON
		2	TVS
10	PRINTERS (LASER)	1	HP
		2	IBM
11	COMPUTER FURNITURE	1	ADARSH CONTROLS
		2	COSMOS MEDIA
		3	FEATHER LITE
		4	GODREJ
		5	OTS



Sl. No.	Item Description	Vendor Name	
		6	PYROTECH
12	CONTROL PANEL/RACK	1	PYROTECH
		2	RITTAL
13	PRESSURE GAUGES	1	A. N. INSTRUMENTS PVT. LTD.
		2	ASHCROFT INDIA
		3	GENERAL INSTRUMENTS CONSORTIUM
		4	MANOMETER (INDIA) PVT.LTD
		5	WIKA
		6	FORBES MARSHALL LTD.
		7	GLUCK (INDIA) MFG.CO.
		8	WAAREE INDUSTRIES
		9	BUDENBERG GAUGE CO. LTD.
14	PRESSURE SWITCHES	1	ASHCROFT INDIA
		2	INDFOS INDUSTRIES LTD.
		3	SOR INC.
		4	SWITZER INSTRUMENT CO.
		5	TRAFAG-INDIA
		6	DELTA CONTROLS LTD.
15	ELECTRONIC TRANSMITTER	1	EMERSON PROCESS
		2	HONEYWELL
		3	YOKOGAWA
		4	FUJI
16	TEMPERATURE GAUGE	1	A. N INSTRUMENTS PVT. LTD.
		2	ASHCROFT INDIA
		3	GENERAL INSTRUMENTS CONSORTIUM
		4	GOA THERMOSTATIC INSTUMENTS
		5	WIKA
		6	FORBES MARSHALL
		7	WAREE
17	TEMPERATURE SWITCH	1	GENERAL INSTRUMENTS CONSORTIUM
		2	INDFOS INDUSTRIES LTD.
		3	SWITZER INSTRUMENT CO.
		4	AN INSTRUMENTS
18	TEMPERATURE ELEMENT	1	DETRIVE
		2	GENERAL INSTRUMENS CONSORTIUM



Sl. No.	Item Description	Vendor Name	
		3	INDUSTRIAL INSTRUMENTS
		4	PYRO ELEC INSTRUMENTS GOA P. LTD.
		5	TEMPSENS INSTRUMENTS (I) PVT. LTD.
19	ROTA METER	1	EUREKA
		2	FLUIDYNE INSTRUMENTS
		3	IEPL
		4	PLACKA INSTRUMENTS INDIA PVT. LTD.
		5	TRAC
20	SIGHT FLOW INDICATOR	1	CHEMTROLS SAMIL
		2	LEVCON INSTRUMENTS PVT. LTD.
		3	V.AUTOMAT & INSTRUMENTS PVT LTD.
		4	FORBES MARSHALL LTD.
21	FLOW SWITCH	1	GENERAL INSTRUMENTS CONSORTIUM
		2	KROHNE MARSHALL
		3	SWITZER INSTRUMENT CO.
22	IMPACT HEAD TYPE ELEMENT	1	DETREICH / EMERSON PROCESS
		2	MIDWEST
		3	STARMECH
		4	SWITZER INSTRUMENT CO.
		5	VERIS INC.
23	LEVEL GAUGE	1	CHEMTROLS ENGG. (P) LTD.
		2	LEVCON INSTRUMENTS (P) LTD.
		3	S. B. ELECTRO-MECHANICALS PVT. LTD.
		4	V. AUTOMAT & INSTRUMENTS PVT. LTD.
		5	DK INSTRUMENTS
		6	SIGMA INSTRUMENTS COMPANY
24	LEVEL SWITCH (FLOAT TYPE)	1	CHEMTROLS
		2	MAGNETROL INTERNATIONAL NV
		3	DK INSTRUMENTS
		4	LEVCON INSTRUMENTS P LTD.
25	LEVEL SWITCH (CONDUCTIVITY TYPE)	1	LEVEL STATE, UK
		2	SOLARTON/MOBREY, UK
		3	YARWAY
26	LEVEL SWITCH	1	ENDRESS + HAUSER



Sl. No.	Item Description	Vendor Name	
	(CAPACITANCE TYPE)	2	DK INSRTUMENTS
27	LEVEL SWITCH (DISPLACEMENT TYPE)	1	DRESSER VALVES INDIA LTD.
		2	CHEMTROLS
		3	DK INSRTUMENTS
		4	ECKARDT
28	LEVEL TRANSMITTER (ULTRASONIC TYPE)	1	EMERSON PROCESS
		2	ENDRESS + HAUSER
		3	SIEMENS MIL TRONICS
		4	VEGA
29	LEVEL TRANSMITTER (RADAR Type)	1	ENDRESS + HAUSER
		2	VEGA
30	BUNKER/SILO LEVEL 3D MONITORING (ULTRASONIC TYPE)	1	E & H
		2	SIEMENS
		3	VEGA-GERMANY
31	VIBRATION MONITORING SYSTEM /TURBINE SUPERVISORY MONITORING SYSTEM	1	GE (for BENTLY NEVADA SYSTEM)
		2	MEGGIT
		3	SHINKAWA, JAPAN
32	MERCURY MONITORING	1	DURAG GMBH AND CO KG
		2	SICK
		3	SHINKAWA
33	Dust Density Monitor	1	CODEL INTERNATIONAL LTD.
		2	DURAG GMBH AND CO KG
		3	LAND INSTRUMENTS INTERNATIONAL
		4	SICK GMBH
34	CO Analyzer (in situ type)	1	CODEL INTERNATIONAL LTD.
		2	LAND INSTRUMENTS INTERNATIONAL
		3	SICK GMBH
35	Oxygen Analyzer (Zirconia Probe type)	1	EMERSON PROCESS MANAGEMENT
36	SO ₂ -NOx/CO/CO ₂ Analyzer(Insitu Type)	2	CODEL INTERNATIONAL LTD
		3	PROCAL
		4	SICK GMBH
37	SWAS system (with selected analysers from Rosemount Analytical / Hack Ultra-France, Orion – USA, Hach-USA. ABB – UK, Polymetron- France/Zeltwegger -Analyticals)	1	ABB LTD.
		2	EMERSON PROCESS MANAGEMENT INDIA PVT.
		3	FORBES MARSHALL
38	DUST MONITOR	1	SIEMENS MILLTRONICS



Sl. No.	Item Description	Vendor Name	
		2	FILTER SENSE
		3	BIN MASTER
39	PULSE JET CONTROLLER	1	SWITCHING CIRCUIT
		2	ADVANCE CONCEPT
		3	VOLTCRAFT
		4	SQUARE M
		5	MICRO SYSTEM
40	AIR FILTER REGULATOR	1	JRU INSTRUMENTS (Formerly PLACKA)
		2	SHAVO NORGREN (INDIA) PVT. LTD.
41	ELECTRO PNEUMATIC CONTROLLER	1	MTL INDIA PVT. LTD.
		2	WATSON SMITH LTD.
		3	FAIRCHILD
42	SMART POSITIONER	1	EMERSON PROCESS MANAGEMENT
		2	SIEMENS
		3	ABB
43	SOLENOID VALVE	1	ASCO (I) LTD.
		2	ROTEX AUTOMATION LTD.
		3	NUCON INDUSTRIES PVT LTD
44	FEP INSULATED CABLE (For TG control)	1	DELTON CABLES
		2	HABIA CABLES
		3	LAPP CABLES
		4	LEONI KERPEN
		5	TEMPENS INSTRUMENTS (I) PVT. LTD.
		6	THERMOELECTRIC
45	PTFE INSULATED CABLES (For TG control)	1	ADVANCE CABLES TECHNOLOGIES
		2	DELTON CABLES
		3	FLUTEF INDUSTRIES
		4	RELIANCE INDUSTRIES
		5	RJ INDUSTRIAL CORPORATION
		6	TEMPSENS INSTRUMENTS (I) PVT. LTD.
		7	TOSHNIWAL CABLES PRIVATE LTD
		8	UNIVERSAL CABLES LIMITED
46	INSTRUMENTATION CONTROL CABLE/ COMPENSATING CABLE / THERMOCOUPLE EXTENSION CABLES	1	ADVANCE CABLES TECHNOLOGIES
		2	CORDS CABLE INDUSTRIES PVT. LTD.
		3	DELTON CABLES LTD.
		4	HABIA CABLES
		5	KEI INDUSTRIES LTD.
		6	KERPEN CABELS



Sl. No.	Item Description	Vendor Name	
		7	LAPP CABLES
		8	NICCO CABLE
		9	POLYCAB WIRES PVT.LTD
		10	THERMO CABLES LTD.
		11	THERMO ELECTRIC
		12	UNIVERSAL CABLES LTD.
47	POWER CABLE (LT)	1	CCIL
		2	KEI INDUSTRIES LTD.
		3	POLYCAB
		4	RELIANCE ENGRS.
		5	THERMO ELECTRIC
		6	ADVANCE CABLES TECHNOLOGIES
		7	RELIANCE ENGRS.
		8	CORDS CABLES
		9	DELTON CABLES
		10	INCAB
		11	PARAMOUNT CABLES
		12	RADIANT CABLES
		13	TORRENT
		14	UNIVERAL CABLES
48	FO CABLES	1	SYSTIMAX
		2	TYCO/AMP
		3	MOLEX
49	UPS & ACDB	1	EMERSON NETWORK
		2	MERLINEGERINE
		3	HITACHI HIREL ELECTRONICS
50	24 V DC BATTERY CHARGER & DCDB	1	CALDYNE
		2	CHHABI ELECTRICALS
		3	HBL POWER SYSTEMS
		4	DB POWER
51	HART COMMUNICATOR (HAND HELD)	1	EMERSON PROCESS
		2	YOKOGAWA
		3	ABB
		4	HONEYWELL
52	MASTER & SLAVE CLOCK SYSTEM	1	HATHWAY
		2	HOPF
		3	SERTEL ELECTRONICS
		4	MASIBUS



Sl. No.	Item Description	Vendor Name	
53	PUBLIC ADDRESSING SYSTEM (ANALOG SYSTEM)	1	BOSCH SECURITY SYSTEMS
	PUBLIC ADDRESSING SYSTEM (IP ADDRESSABLE)	2	STENTOFONE (from ZENITAL GROUP)
		3	INDUSTRONIC
		4	COMMEND
54	EPABX	1	ABB INDIA PVT. LTD.
		2	BPL TELECOM PVT. LTD.
		3	CROMPTON GREAVES LTD.
		4	HCL INFINET LTD.
		5	SIEMENS LTD.
		6	ABC INDIA PVT LTD.
55	CCTV System	1	BOSCH
		2	HONEYWELL
		3	PELCO
56	LIE/LIR	1	CHEMIN CONTROLS
		2	ELECTRONICS CORP. OF INDIA LTD.
		3	PYROTECH
		4	FORBES MARSHAL
		5	INSTRUMENTATION LIMITED
		6	PRAMMEN INDUSTRIES
57	CONDENSATE POTS	1	FLOWTECH
		2	INSTRUMENTATION LIMITED
		3	PRECISION ENGG INDUSTRIES
		4	BALDOTA VALVE AND FITTING CO. PVT LTD.
		5	METPRESS ENGINEERING WORKS
		6	MICROPRECISION
58	IMPULSE PIPES	1	BHARAT HEAVY ELECTRICALS LTD.
		2	INDIA SEAMLESS METAL TUBES LTD. (only for CS Pipes)
		3	JINDAL SAW PIPES LTD.
		4	MAHARASHTRA SEAMLESS (only for CS Pipes)
		5	MANNESMANN AG
		6	SUMITOMO CORPORATION
		7	TPS TECHNITUBE ROHREN WERKE GMBH
		8	TROUVAY CAUVIN GULF E.C. DUBAI
		9	BALDOTA VALVE AND FITTING CO. PVT. LTD.



Sl. No.	Item Description	Vendor Name	
		10	BHARAT HEAVY ELECTRICALS LTD.
		11	EXCEL HYDRO – PHEUMATICS PVT. LTD.
		12	INSTRUMENTATION LTD.
		13	METPRESS ENGINEERING WORKS
		14	MAHALAKSHMI SEAMLESS
		15	RATNAMANI METALS & TUBES LTD.
59	INSTRUMENT VALVES / MANIFOLDS	1	BHARAT HEAVY ELECTRICALS LTD.
		2	BALDOTA VALVE AND FITTING CO PVT LTD.
		3	INSTRUMENTATION LIMITED
		4	METPRESS ENGINEERING WORKS
		5	EXCEL HYDRO-PNEUMATICS PVT. LTD.
		6	METPRESS ENGINEERING WORKS
		7	FLOWTECH
60	COMPRESSION FITTINGS	1	PARKER HANNIFIN
		2	PRECISION ENGG INDUSTRIES
		3	TROUVAY & CAUVIN
		4	HOKE (TECHNICAL PARTS CO. MUMBAI)
		5	SWAGELOCK
		6	METPRESS ENGINEERING WORKS
61	SOCKET WELD FITTINGS	1	EXCEL HYDRO-PNEUMATICS PVT. LTD.
		2	METPRESS ENGINEERING WORKS
		3	V.K. INDUSTRIES
		4	VIKAS INDUSTRIAL PRODUCTS
		5	BALDOTA VALVE AND FITTING CO PVT LTD.
		6	FLOWTECH
FIRE DETECTION AND HYDRANT SYSTEM VENDORS			
1	HYDRANT VALVES	1	SHAH BHOGILAL
		2	SUKAN
		3	NEWAGE
		4	VENUS
		5	WINCO
2	FIRE HOSES	1	NEWAGE
		2	CHATTARIA RUBBER
3	WATER MONITOR & WATER-	1	SHAH BHOGILAL



Sl. No.	Item Description	Vendor Name	
	CUM FOAM MONITORS	2	HD FIRE
		3	NEW AGE
		1	SUKAN
		2	VENUS
4	BRANCH PIPE, NOZZLES, COUPLINGS & FIRE BRIGDAE CONNECTIONS	3	NEW AGE
		4	WINCO
		1	HD FIRE
		2	TYCO (GRINELL)
5	DELUGE VALVES	3	KIDDE (I) LTD.
		1	KIDDE (I) LTD.
		2	TYCO
6	HVW/ MVW SPRAY NOZZLE	3	HD FIRE
		1	TYCO(GRINELL)
		2	HD FIRE
7	QUARTZOID BULB SPRINKLERS/DETECTORS	3	NEWAGE INDUSTRIES
		1	ARC WELD ENGINEERS
		1	SIMPLEX
9	MICROPROCESSOR BASED FIRE ALARM PANEL	2	SCHRACK
		3	ESSER HONEYWELL
		4	DETECTOMAT
		5	SECUTRON
		6	GENT
		1	AP SENSING, Germany
10	LHS CABLE (FO Type)	2	SENSA, UK
	LHS CABLE (Intelligent Addressable Thermal Sensor Based)	1	Listec (Schrack)
11	FOAM PUMP	1	DEL PD PUMPS & GEARS
12	FOAM TANKS	1	ARC WELD ENGINEERS
13	ADDRESSABLE MULTISENSOR TYPE DETECTORS	1	SIMPLEX
		2	SCHRACK
		3	ESSER HONEYWELL
		4	DETECTOMAT
		5	SECUTRON
		6	GENT
14	ADDRESSABLE PHOTO ELECTRIC TYPE DETECTORS	1	SIMPLEX
		2	SCHRACK
		3	ESSER HONEYWELL
		4	DETECTOMAT
		5	SECUTRON



Sl. No.	Item Description	Vendor Name	
		6	GENT
15	ADDRESSABLE HEAT DETECTORS	1	SIMPLEX
		2	SCHRACK
		3	ESSER HONEYWELL
		4	DETECTOMAT
		5	SECUTRON
		6	GENT
16	INFRA RED DETECTORS	1	PATOL
		2	SYSTEM SENSOR
17	COATING & WRAPPING MATERIAL/ TAPE (COAL TAR BASED)	1	IWL LTD.
		2	RUSTECH
18	INERT GAS SYSTEM	1	GINGEKERR
		2	ANSUL
		3	SRI
		4	SIEMENS
19	BATTERY	1	EXIDE
		2	AMCO
20	FIRE SURVIVAL CABLES	1	POLYCAB
		2	RRKABEL
		3	KEI
		4	DELTON
21	HOSE REEL	1	SIEMENS
		2	WINCO
23	FIRE EXTINGUISHER	1	BIS APPROVED SOURCES WITH VALID LICENSE
24	PROBE TYPE HEAT DETECTOR	1	KIDDE
		2	TYCO
HVAC SYSTEM VENDORS			
1	AIR WASHER & UAF	1	HYDERABAD POLLUTION CONTROL
		2	ADVANCE VENTILATION
		3	DRAFT AIR
		4	BLUE STAR
		5	VOLTAS
		6	STERLING WILSON
		7	ROOTS COOLING SYSTEM
		8	C DOCTOR
2	CENTRIFUGAL FAN	1	FLAKT
		2	KRUGER



Sl. No.	Item Description	Vendor Name	
		3	DRAFT AIR
		4	HYDERABAD POLUTION CONTROL
		5	ADVANCE VENTILATION
		6	PATEL AIR
		7	MARATHON
		8	CB DOCTOR
		9	SARLA
3	FRESH AIR/ SUPPLY/ EXHAUST/ RE UNIT FANS / PROPELLAR	1	HYDERABAD POLUTION CONTROL
		2	ADVANCE VENTILATION
		3	KRUGER
		4	NICOTRA
		5	MARATHON
		6	FLAKT
		7	CB DOCTOR
		8	KHAITAN
4	PUMPS	1	BEST & CROMPTON
		2	JYOTI
		3	SAM TURBO
		4	KBL
		5	KSB
		6	M&P
		7	VOLTAS
		8	WORTHINGTON
		9	FLOWMORE
		10	SULZER PUMPS INDIA LTD.
		11	FLOWSERVE INDIA CONTROL PVT LTD
5	LV MOTORS (NON FLAME PROOF)	1	SIEMENS
		2	ABB
		3	CGL
		4	MARATHON
		5	KEC
		6	BHARAT BIJLEE
		7	NGEF
6	AIR FILTER	1	PUROLATOR
		2	FMI
		3	ANFILCO
		4	JOHN FOWLER
		5	SPECTRUM



Sl. No.	Item Description	Vendor Name	
		6	AIR TECH
		7	PUROMATIC
7	INSULATION MATERIAL	1	BEARDSHEL
		2	ARMAFLEX
		3	LLOYDS
		4	UP TWIGA
		5	AEROCELL
8	FIRE DAMPER	1	TSC
		2	CARRYAIRE
		3	RAVISTAR (SYSTEM AIR)
9	GRILL/ DIFFUSER/ VOLUME CONTROL DAMPER	1	CARRYAIRE
		2	RAVISTAR (SYSTEM AIR)
10	HUMIDISTAT	1	JHONSON CONTROL
		2	HONEYWELL AUTOMATION
		3	PENN
11	SCREW CHILLER	1	CARRIER
		2	KIRLOSKAR
		3	DUNHAM BUSH
		4	BLUE STAR
		5	VOLTAS
		6	MCQUAY (DAIKIN)
		7	CLIMAVENETA
12	PRECISION AC	1	STULZ
		2	UNIFLAIR
		3	BLUEBOX
		4	EMERSON PROCESS MANAGEMENT
		5	CLIMAVENETA
13	SPLIT AC	1	VOLTAS
		2	BLUE STAR
		3	CARRIER
		4	HITACHI
		5	DAIKIN
		6	LG
14	AIR HANDLING UNITS	1	VOLTAS
		2	BLUE STAR
		3	ZECO
		4	CARRYAIRE (flakt)
		5	EDGETECH



Sl. No.	Item Description	Vendor Name	
		6	ETHOS
		7	SYSTEM AIR
		8	WAVES AIRCON
15	AHU FAN (CENTRIFUGAL FAN)	1	CB DOCTOR
		2	FLAKT
		3	KRUGER
		4	NICOTRA
		5	COMEFRI
		6	MARATHON
		7	ADVANCE
		8	DRAFT AIR
		9	HYDERABAD POLLUTION
16	PUMPS	1	BEST & CROMPTON
		2	JYOTI
		3	SAM TURBO
		4	KBL
		5	KSB
		6	M&P
		7	VOLTAS
		8	BEACON-WEIR
		9	WORTHINGTON
		10	FLOWMORE
		11	SULZER PUMPS INDIA LTD.
		12	FLOWERVE INDIA CONTROL PVT LTD
		13	V-FLOW PUMPS & SYSTEMS CO
17	COOLING TOWER	1	PAHARPUR COOLING TOWER
		2	FLOWTECH
		3	BELL
18	LV MOTORS (NON FLAME PROOF)	1	SIEMENS
		2	ABB
		3	CGL
		4	MARATHON
		5	KEC
		6	BHARAT BIJLEE
		7	NGEF
		8	JYOTI
19	AIR FILTER	1	PUROLATOR



Sl. No.	Item Description	Vendor Name	
		2	FMI
		3	ANFILCO
		4	TENACITY
		5	JOHN FOWLER
		6	SPECTRUM
		7	AIR TECH
		8	PUROMATIC
20	BALANCING VALVE	1	ADVANCE
21	4 WAY MIXING VALVE WITH ACTUATING MOTOR	1	SIEMENS BUILDING TECHNOLOGY
		2	JOHNSON
		3	BELIMO
		4	HONEYWELL AUTOMATION
		5	RAPID CONTROL
		6	ALC
22	Y / POT STRAINER	1	MULTITEX
		2	GREAVES COTTON
		3	JAYPEE
		4	SANT VALVES
		5	OTOKLIN
		6	GUJARAT OTOFILT
		7	DS ENGG
		8	SAROJINI ENTERPRISE
		9	BHATIA ENGINEERING
		10	FILTRATION ENGINEERS INDIA PVT LTD
23	STRIP HEATER	1	ESCORTS
		2	RACOLDS
		3	ALCO
		4	HEATCO
24	PAN HUMIDIFIER	1	RAPID COOL
		2	HOTSET
		3	ALCO
25	RELIEF / PURGE VALVE	1	BRASSOMATIC
26	THERMOSTATS	1	HONEYWELL AUTOMATION
		2	RANCO
		3	PENN
		4	DANFOSS
		5	RANUTROL
		6	INDFOSS JHONSON CONTROL



WBPDCL

Annexure-I

Sl. No.	Item Description	Vendor Name	
27	ANTI FREEZE THERMOSTAT	1	RANCO
		2	HONEYWELL AUTOMATION
		3	PENN
		4	DANFOSS
		5	INDFOSS
28	RH SENSOR/TEMP SENSOR	1	HONEYWELL AUTOMATION
		2	JOHNSON
		3	SIEMENS
		4	GENERAL INSTRUMENT CONSORTIUM
29	WATER SOFTENING PLANT	1	THERMAX
		2	ION EXCHANGE



**ANNEXURE#7
of
Wagon Tippler Package
for**

SAGARDIGHI THERMAL POWER PROJECT

1 x 660 MW UNIT NO. 5, PHASE – III

WEST BENGAL POWER DEVELOPMENT CORPORATION LIMITED

Content:

- Technical Data Sheet (to be filled by bidders)
- Guaranteed Auxiliary Power (to be declared by bidder)



**TECHNICAL PROPOSAL PARTICULARS
FOR
WAGON TIPPLER PACKAGE**

CONTENTS

ANNEXURE#7

TECHNICAL PARTICULARS – MECHANICAL

DESCRIPTION

General

Painting

Wagon Tippler

Side Arm Charger

Apron Feeder

Integral Weigh Bridge

E.O.T. Crane

GENERAL

- 4.0.0 Confirm that interfacing provisions :
as asked for in NIT shall be
provided by bidder after doing
proper engineering for the same
subject to Purchaser's approval.
- 5.0.0 Confirm that special provisions
relating to fire protection system
shall be provided by bidder as
asked for in NIT.
- 6.0.0 Confirm that the painting :
of mechanical equipment
shall be done as per NIT.
- 7.0.0 Confirm that the fill of :
lubricants till commissioning &
handing over of the plant is
included in bidder's scope of work.
- 8.0.0 Please confirm that the :
commissioning spares will be
included in bidder's scope and
a full set of the same shall be
handed over to the plant owner.
- 10.0.0 Confirm that deviations taken if :
any, has been indicated in
respective technical & commercial
deviation schedules only.
- 11.0.0 Confirm that any data asked for in :
this schedule if not furnished shall
be subject to purchaser's approval
during detailed engineering.

PAINTING OF MECHANICAL ITEMS
(Fill up for each item/equipment)

Sl. No.	Item/ Equipment	Pretreatment	Primer Coat (1st & 2nd)			Finish Coat (1st, 2nd & 3rd)		
			DFT	Type	Colour Code	DFT	Type	Colour Code

WAGON TIPLER

- | | | |
|--------|---|---------------------|
| 1.0.0 | Manufacturer | : |
| 2.0.0 | Design (Put the name of the Company) | : |
| 3.0.0 | Number, Type & Model No. | : |
| 3.1.0 | Ring | :Outboard / Inboard |
| 4.0.0 | Platform Size | : |
| 5.0.0 | State the type of wagons that can be handled | : |
| 6.0.0 | Maximum and minimum dimension of wagon that can be handled | : |
| 7.0.0 | Maximum gross weight that can be handled | : |
| 8.0.0 | Maximum Axle load that can be carried on rail | : |
| 9.0.0 | If the tippler suitable for through traffic. If so that state – | :Yes/No |
| | a) Load/Axle of main line loco | : |
| | b) Speed of main line loco | : |
| 10.0.0 | Tipping time per cycle (sec.) with break up | : |
| 11.0.0 | Min. nos. of Tippling per hour (considering inhaul & outhaul operation) | : |
| 12.0.0 | Maximum angle of rotation | : |
| 13.0.0 | Lubrication Details | : |

WAGON TIPPLER

- | | | |
|--------|---|--|
| 14.0.0 | Type of Wagon Clamping arrangement :
& provision for change in type of wagon | |
| 15.0.0 | Details of Speed reduction with type :
and make of gear and reduction ratio | |
| 16.0.0 | Type of high speed & low speed :
couplings | |
| 17.0.0 | Type & No. of Brakes : | |
| 18.0.0 | Details of Motor – | |
| | a) Motor HP : | |
| | b) Type & Make : | |
| | c) Drive Motor Data as asked for in :Yes/No
motor specification furnished | |
| 19.0.0 | All control gear as per specification :Yes/No
like limit switches, photo electric cells
etc. included | |
| 20.0.0 | Is it suitable for operation by one :Yes/No
operator from control room for entire
tippler and marshalling machine | |
| 21.0.0 | Photo electric wagon detection :Yes/No
Equipment considered | |

SIDE ARM CHARGER

1.0.0	Wagon Hauling Equipment (Side Arm Charger)	:
1.1.0	Time & Number	:
1.2.0	Manufacturer	:
1.3.0	Capacity (tonnes)	:
1.4.0	Travel (Metres)	:
1.5.0	Speed of hauling (M/Min.)	:
1.6.0	Return Speed (M/Min.)	:
1.7.0	Consumed HP	:
1.8.0	Track gauge, mm	:
1.9.0	Size of rail & length, mm	:
1.10.0	Wheels type, size	:
1.11.0	Type of bearing & size	:
1.12.0	Arrangement of lubrication of bearings	:
1.13.0	Brake	:
1.13.1	Number & type	:
1.13.2	Make & location	:
1.13.3	Rating & size	:
1.14.0	Speed Control	:
1.14.1	Type	:

SIDE ARM CHARGER

1.14.2	Speed reduction –	
	- Forward	:
	- Return	:
1.14.03	Type of control equipment furnished	:
1.15.0	Motor	:
1.15.1	Type	:
1.15.2	Power supply	:
1.15.3	HP & RPM	:
1.16.0	Wagon couplings arrangement	:
1.16.1	Type of wagon coupling	:

Sheet 1 of 3

APRON FEEDER

1.0.0 Name & Model No. :

2.0.0	Type	:
3.0.0	Nos. Offered	:
4.0.0	Material Handled	:
4.1.0	Feed Size (max.)	:
4.2.0	Bulk Density	:
4.3.0	Moisture Content (Max.)	:
4.4.0	Clay Content	:
4.5.0	HGI	:
5.0.0	Capacity (TPH)	:
5.1.0	Rated Capacity Guaranteed	:
5.2.0	Capacity variation range	:
5.3.0	Speed of pan	:
6.0.0	Size of Apron Feeder	:
6.1.0	Overall width	:
6.2.0	Overall length	:
6.3.0	Centre to centre distance between drive & tail sprocket	:
7.0.0	Pan detail	
7.1.0	Width of pan	:
7.2.0	Length of each pan	:

Sheet 2 of 3

APRON FEEDER

7.3.0	Weight of each pan (Kg.) approx.	:
7.4.0	Total no. of pans	:
8.0.0	Sprocket detail	:
8.1.0	Type	:

8.2.0	Size	:
9.0.0	Chain	:
9.1.0	Link size (c/c)	:
9.2.0	Total qty. of link for one m/c.	:
10.0.0	Supporting rollers	:
10.1.0	Nos. of rollers in carrying side	:
10.2.0	Nos. of rollers in return side	:
11.0.0	Material of construction	:
11.1.0	Pan	:
11.2.0	Chain	:
11.3.0	Rollers	:
11.4.0	Side wall and liner	:
11.5.0	Shafts	:
11.6.0	Frame	:
12.0.0	Drive	:
12.1.0	Motor KW/RPM	:
12.2.0	Drive arrangement	:

Sheet 3 of 3

APRON FEEDER

12.3.0	Drive system & motor supporting arrangement	:
12.4.0	Motor type & Make	:
13.0.0	Dribble Conveyor	:
13.1.0	Type	:
13.2.0	Motor KW	:

13.3.0	Size (C/c length and width)	:
13.4.0	Drive system & supporting arrgt.	:
13.5.0	Speed of conveyor	:
13.6.0	Supporting arrangement	:
14.0.0	Noise level 1 M away from feeder Under no-load condition	:
15.0.0	Weight of Apron feeder (without side wall etc.)	:
16.0.0	Weight of dribble feeder	:
17.0.0	Weight of heaviest piece to be Lifted for maintenance	:
18.0.0	Total weight of side wall including Liner (approx.)	:
19.0.0	Catalogue enclosed	: Yes/No
20.0.0	Type of lubrication system	:

Sheet 1 of 1

INTEGRAL WEIGHBRIDGE

1.0.0	Location	:
2.0.0	Type	:
3.0.0	Nos. required	:
4.0.0	Weighing position	:
5.0.0	Display & output.	:
6.0.0	Location of control console	:
6.1.0	Tare weight determination	:

7.0.0 Type of wagon :

Sheet 1 of 3

E.O.T. CRANE

1.0.0 Type, make & class of Crane offered :

2.0.0 Crane capacity :

3.0.0 Crane lift (M) :

4.0.0 Location & quantity :

5.0.0 Does it conform to specification : Yes / No

6.0.0 Travel speed (M/sec.) :

6.1.0 Long Travel :

6.2.0 Cross Travel :

7.0.0 Hoisting speed (M/sec.) :

8.0.0	Gears	
8.1.0	Type	:
8.2.0	Material	:
9.0.0	Brake	
9.1.0	Type & make	:
9.2.0	No. of brake provided for Crane	:
9.3.0	Detailed description/rating	:
9.4.0	Holding torque (Kg-m) (Mention in the schedule)	:
9.5.0	Material of construction	:

Sheet 2 of 3

E.O.T. CRANE

10.0.0	Bearing	:
10.1.0	Type	:
10.2.0	Lubrication	:
10.3.0	Life	:
11.0.0	Hook	
11.1.0	Type	:
11.2.0	Material	:
11.3.0	Does it conform to IS-2758	: Yes/No
12.0.0	Wire Rope	
12.1.0	Factor of safety used	:
12.2.0	Construction	:

- 12.3.0 Rope diameter (mm) :
- 12.4.0 Breaking strength (Kg/Sq.M) :
- 12.5.0 Is it as per IS-3938 & IS-2365 :
- 13.0.0 Hoist Drum
- 13.1.0 Material :
- 13.2.0 Is it as per IS-3938 :
- 14.0.0 Hoisting/Travel Motor
- 14.1.0 Make :
- 14.2.0 Rating :

E.O.T. CRANE

- 14.3.0 Does conform to specification : Yes/No
- 14.4.0 Operating voltage & frequency :
with variations
- 15.0.0 Limit switches for hoisting/
travel motion
- 15.1.0 Make :
- 15.2.0 Type :
- 15.3.0 Numbers provided :
- 16.0.0 Flexible trailing cable
for travel
- 16.1.0 Make :
- 16.2.0 Size :
- 16.3.0 Travel (m) :
- 17.0.0 Whether all parts will be : Yes/No
tested as per relevant IS
and certificates provided
- 18.0.0 Method of hoist operation :
- 19.0.0 Whether control station : Yes/No
provided as per specn.
- 20.0.0 Rail & end stop provided : Yes/No
- 21.0.0 Catalogue enclosed : Yes/No

AUXILIARY POWER CONSUMPTION, 1x660 SAGARDIGHI TPS

Guaranteed Power Consumption to be filled in by bidder

AUXILIARY POWER CONSUMPTION FOR WAGON TIPPLER PACKAGE

Sl.No.	Eqpt/BCN	Actual KW	motor rating factor	power consumption	Duty Factor	FLOW Path	Final KW FLOW Path from WT to the last bunker feeding conveyor
		I	II	III=I X II	IV	V	VI=III X IV X V
A	COAL HANDLING SYSTEM						
1	Twin Wagon Tippler				1	1	
2	Side Arm Charger				1	1	
3	Indexer				1	1	
4	Apron Feeder along with dribble feeder-1				1	1	
5	Apron Feeder along with dribble feeder-2				1	1	

GUARANTEED TOTAL POWER CONSUMPTION (KW)

Note-1: Bidder to note that the guaranteed power consumption for Coal handling system Conveyor package shall not exceed 650 kW. BHEL will load the offered price as per BHEL GCC.

Note-2: As per Tender Mendment V.IIA/Amend-3/Sch. Of guarantees: fFlow Path Fro Wagon tippler to the boiler bunker of UNIT#5 through both conveyor no. BCN-27A and BCN-27B (Longest Path) running simultaneously (Duty factor for CHP shall be 1.0)



**ANNEXURE#8
of
Wagon Tippler Package
for**

**SAGARDIGHI THERMAL POWER PROJECT
1 x 660 MW UNIT NO. 5, PHASE – III
WEST BENGAL POWER DEVELOPMENT CORPORATION LIMITED**

Content:

- **Mandatory Spares List -(mechanical & electrical)**

Sl. No.	Equipment/Package Name	Quantity to be supplied for the Package
A	Mechanical Mandatory Spares	
1.00.00	Wagon Tippler Package	
1.01.00	TWIN WAGON TIPPLER	
1.01.01	Hydraulic Power Pack for Clamping system	
i.	Valves	1 no. of each size and type
ii.	O.P. Coolers	1 no.
iii.	Filter elements	10 nos. of each type
vi.	Pressure Switch	1 no. of each type
v.	Temperature switch	1 no. of each type
1.01.02	Limit Switches	2 nos. of each type
1.01.03	Hydraulic Cylinder Manifold block with all valves mounted on it	1 no.
1.01.05	Hydraulic cylinder with piston	2 no.
1.01.06	Seals of hydraulic cylinder and pumps etc	2 sets of each type
1.01.07	Hydraulic hoses	2 no. of each type and size
1.01.08	Rod end bearings with housing	1 set for all four clamps
1.01.9	Pressure switches	1 no.
1.01.10	Common manifold block complete with all valves mounted on it.	1 no.
1.01.11	Main Pivot bearing.	01 no
1.01.14	Chain & sprocket	01 set
1.01.15	Pinion	02 no.
1.01.16	Other Electrical Spares as applicable as per the Electrical List	Item & Quantity as indicated in electrical spare list.
1.01.17	Load cell complete set	1no.
1.01.18	Pinion Shaft	2 Nos.
1.01.19	Latch(Pinion & rack segment locking device)	1 No.
1.02.00	SIDE ARM CHARGER	
1)	Guide Wheel assembly consisting of	
i.)	Bearing	1 set of each type & size
ii.)	Oil Seal	2 set of each type & size
iii.)	Guide wheel fitted with shaft	1 set
2	Runner wheel Assembly	1 No.
3	Bearing	1 no. of each type
1.03.00	APRON FEEDER	
1.03.01	Head pulley complete with shaft	1 No.
1.03.02	Tail pulley complete with shaft	1 No
1.03.03	Traction rollers	20% of the total used in the system.
1.03.04	Carrying idlers	20 % of the total used in the system
1.03.05	Return rollers	20 % of the total used in the system
1.03.06	Sprocket segments	2 sets of each type and size
1.03.07	Link chain	20 % of each type and size
1.03.08	Pans (flights)	10%
1.03.11	Plummer blocks	1 No of each type and size
1.03.12	Bearings	1 No for each type and size.
1.04.00	HYDRAULIC DRIVE SYSTEM	
1.04.01	Complete set of Hydraulic Pump with drive Motor for Hydraulic Power Unit	1no. each type, size & rating used in coal handling plant including Wagon Tippler, side Arm, Indexer, Apron Feeder & Conveyors.
1.04.02	Complete set of Hydraulic Motor	1no. each type, size & rating used in coal handling plant including Wagon Tippler, Apron Feeder & Conveyors.
1.04.03	Oil Hose	Two complete set (comprising of pump-end & Hydraulic Motor-end) for each type of application
1.04.04	Controller	
i.	Complete set of Controller	1no.
ii.	Power Supply Cards	2 nos. each type used in the system
iii.	Controller Cards	2 nos. each type used in the system

Sl. No.	Equipment/Package Name	Quantity to be supplied for the Package
iv.	Interposing Relay	2 nos. each type used in the system
1.04.05	Solenoid Coil for Pumps.	2 nos. each type used in the system
1.04.06	Seal kit for Pumps	2 sets each type used in the system
1.04.07	Pressure Switches	2 nos. each type used in the system
1.04.08	Pressure Transmitter	2 nos. each type used in the system
1.04.09	Temperature Switches/senser	2 nos. each type used in the system
1.04.10	Oil Level Switches	2 nos. each type used in the system
1.04.11	Filter Indicator	2 nos. each type used in the system
1.04.12	Filter Cartridge	4 nos. each type used in the system
1.04.13	Air Filter	2 nos. each type used in the system
1.04.14	Suction Line Indicator	2 nos. each type used in the system
1.05.00	Indexer	
1)	Guide Wheel assembly consisting of	
i.)	Bearing	1 set of each type & size
ii.)	Oil Seal	2 set of each type & size
iii.)	Guide wheel fitted with shaft	1 set
2	Runner wheel Assembly	1 No.
3	Bearing	1 no. of each type
2.01.00	EOT Cranes	
2.01.01	Long Travel Unit	
(i)	Set of Bearings of Wheels	1 Set
(ii)	Set of Gearbox Bearings with Sleeves	1 Set
(iii)	Long Travel end Shaft Bearings	1 Set
(iv)	Seals for Travel Gear Box	1 Set
(v)	Long Travel Brake Shoes Liners	2 Sets
(vi)	Complete Set of Hydraulic Thruster for Brakes (if applicable)	1 No.
(vii)	Brake Spring	1 Set
(viii)	Brake Coil	2 Sets
(ix)	Motor	1 No.
2.01.02	Cross Travel Unit	
(i)	Axle Bearings	1 Set
(ii)	Set of Gearbox Bearings with Sleeves	1 Set
(iii)	Set of seals for Gearbox	1 Set
(iv)	Cross Travel end Shaft Bearing	1 Set
(v)	Cross travel Brake Shoes Liners	2 Sets
(vi)	Complete Set of Hydraulic Thruster for Brakes (if applicable)	1 No.
(vii)	Brake Spring	1 Set
(viii)	Brake Coil	2 Sets
(ix)	Motor	1 No.
2.01.03	Hoist	
(i)	Main Hoist Pulley Bearings [All Bearings of Each Type and size used in all Gear Assemblies, Lifting Hook, Trolley wheels etc.]	1 Set
(ii)	Set of Bearings for Gear box	1 Set
(iii)	Set of seals for Gearbox	1 Set
(iv)	Aux. Hoist Gearbox Bearings	1 Set
(v)	Aux. Hoist Gearbox Seals	1 Set
(vi)	Complete Set of Hydraulic Thruster for Brakes (if applicable)	1 No.
(vii)	Main & Aux. Hoist Brake Shoes [Brake shoes with lining for each size of brake (Pair of each size)]	2 Sets
(viii)	Main & Aux. Hoist Brake Springs	2 Sets
(ix)	Main & Aux. Hoist Brake shoe liners	2 Sets

Sl. No.	Equipment/Package Name	Quantity to be supplied for the Package
(x)	Motor for Main Hoist & Auxiliary Hoist	1 No.
(xi)	Brake Coil	2 Sets
(xii)	Wire Rope for Aux. Hook	100% of one crane
B	Electrical & C&I Mandatory Spares	
1	415V PCC, PMCC, MCC, ACDB, DCDB, Elect. Control Panel (For each PCC, PMCC, MCC, ACDB, DCDB and Elect. Control Panel) (applicable items of PCC, PMCC, MCC, ACDB, DCDB and Elect. Control Panel shall be considered)	
(i)	Indicating Lamps complete assembly	
(a)	Red	3 nos of each make and type.
(b)	Blue	3 nos of each make and type.
(c)	Green	3 nos of each make and type.
(d)	White	3 nos of each make and type.
(e)	Amber	3 nos of each make and type.
(ii)	CT	2 nos. for each make, type and Rating
(iii)	Transducer	2 no for each make, type and Rating
(iv)	Trip / Neutral / close Control Switch	2 nos. for each make, type and Rating
(v)	Switch gear or MCC / Trial / Normal selector switch	2 nos. for each make, type and Rating
(vi)	Local/Remote selector switch	2 nos. for each make, type and Rating
(vii)	AC Supply On / Off Switch	1 no. for each make, type and Rating
(viii)	DC Supply On / Off Switch	1 no. for each make, type and Rating
(ix)	Motor Heater On /Off Switch	1 no. for each make, type and Rating
(x)	DC Supply Source Selector Switch (3-position)	1 no. for each make, type and Rating
(xi)	Ammeter Selector Switch	1 no. for each make, type and Rating
(xii)	Voltmeter Selector Switch	1 no. for each make, type and Rating
(xiii)	Voltmeter	2 no. for each make, type and Rating
(xiv)	Ammeter	2 no. for each make, type and Rating
(xv)	Auxiliary Control Contactor	
(a)	Auxiliary Control Contactor complete assembly	10% of total nos for each make, type and Rating.
(b)	Auxiliary Control Contactor spare kits	10% of total nos. for each make, type and Rating.
(c)	Auxiliary Control Contactor Coils	10% of total nos for each make, type and Rating.
(xvi)	Power Contactor	
(a)	Power Contactor Complete Assembly	10% of total nos for each make, type and rating
(b)	Power Contactor spare kits	10% of total nos for each make, type and Rating.
(c)	Power Contactor Coils	10% of total nos for each make, type and Rating.
(xvii)	MCCB	5% of total nos. for each make, type and rating.
(xviii)	MCB	5% of total nos. for each make, type and rating.
(xix)	Switch Fuse Unit (DC)	10% of total nos. for each make, type and rating.
(xx)	Power Fuse	5% of total nos. for each make, type and rating.
(xxi)	Control Fuse	5% of total nos. for each make, type and rating.
(xxii)	Thermal Overload Relay	5% of total nos. for each make, type and rating.
(xxii)	Sliding contact (Fixed and moving) Complete assembly	2 sets of each make, type and rating
(xxiii)	Busbar to module Lira Contact assembly	2 sets of each make, type and rating (1 set means all 3 ph+ neutral)

Sl. No.	Equipment/Package Name	Quantity to be supplied for the Package
(xxiv)	Control and Aux. Transformer	1 no of each make, type and rating
(xxv)	Delay Timer	2 no of each make, type and rating
(xxvi)	Power Terminal Block	2 sets for each make, type and rating
(xxvii)	Control Terminal Block	2 sets for each make, type and rating
(xxviii)	End plate for Power and Control terminal block	2 sets for each make, type and rating
(xxix)	Energy meter	1 no for each make, type and rating
(xxx)	Relays (Other than numerical relay):	
(a)	Conventional (Electromagnetic/Static type) Relay	2 no for each make, type and rating
(b)	Aux. relays & Lock out relays & TIMERS	2 nos for each make, type and rating
(xxxi)	MCCB Status (On/off) Monitoring Switch/Contact	2 nos for each make, type and rating
(xxxii)	Push Button (On/Off) Complete Assembly	2 nos for each make, type and rating
(xxxiii)	Annunciation Facia with lamps complete set (if applicable)	1 set for each make, type and rating
2	Control Panel/Desk Mounted Items	
a	Push Button Complete assembly	10Nos for each colour
b	Push Button Contact Element (1NO + 1NC) Block	20Nos.
c	Selector Switch	10Nos. for each type and rating
d	Meter (Analog and Digital)	
(i)	Ammeter	2Nos. for each type and range
(ii)	Voltmeter	2Nos. for each type and range
(iii)	Frequency	2Nos. for each type and range
(iv)	MW	2Nos. for each type and range
(v)	MVAR	2Nos. for each type and range
(vi)	Power Factor	2Nos. for each type and range
(vii)	Synchroscope	1No. for each type and range
(viii)	Synchrocheck Relay complete set	1No. for each type and range
(ix)	Transducer	1No. for each type and range
e	Indicating Lamps complete assembly	20Nos. for each Colour and type
f	Mimic Lamps	10Nos. for each Colour and type
g	MCB	5Nos. for each type and rating
h	Door Limit Switch	5Nos.
i	Annunciation system	
(i)	Lamp Box with Facia & Lamps (LED type)	25Nos.
(ii)	Hooter	1No.
(iii)	Each type of PCB (for non-PLC driven system)	1(one) no.
3	Actuator	
a	Complete set of Actuator	2Nos. for each type, make and rating, 1 no. for H2 cooler Temperature controller and 1 no. for stator water temperature controller
b	Power Unit for Modulating Actuator	4Nos. of each type
c	DC-DC Power Pack Unit	4Nos. of each type
d	Electronic cards	4Nos. of each type
e	Position Feed Back Transmitters	4Nos. of each type
f	Control Unit	4Nos. of each type
g	Limit Switch Assembly	2 Nos each type and rating
h	Torque Switch Assembly	2 Nos each type and rating
i	Power Contactor	5Nos. for each type and rating
j	Auxiliary Contactor	5Nos. for each type and rating
k	Thermal Over Load Relay	2Nos. for each type and rating
l	Motor	1No. each type and rating
m	Complete Seal kit	2Sets for each type and rating
n	Complete O-Ring Set	2Sets for each type and rating
4	Illumination	
a	Lighting fixtures without light	20 Sets for each make, type and rating
b	MCCB	5 Nos for each make, type and rating .
c	MCB	20 Nos for each make, type and rating .
d	Power and Control Contactor	5 Nos for each make, type and rating
e	Switches	5 Nos for each make, type and rating .
f	Receptacles with plug	5 Nos for each make, type and rating
g	Rotary switches	2 Nos for each make, type and rating .

Sl. No.	Equipment/Package Name	Quantity to be supplied for the Package
h	LED light	50 nos for each make, type and rating .
i	Clock switch type Time Switch	2 nos for each make, type and rating .
j	Lighting Transformer	1 no for each make, type and rating .
5	Motor	
5.1	11 KV & 3.3 KV Motor	
(i)	Motor of each type and rating (Note : motors covered in mechanical spare items need not to be included here again)	10% of the installed quantity or minimum 1 number whichever be higher
(ii)	Neutral End Terminal Bushing with Fasteners	1 no. for each type and rating of Motor
(iii)	Bearing Temperature Gauge Driving & Non-Driving End	1 set for each type and rating of Motor
(iv)	Phase segregated terminal boxes	2 Nos. for each type and rating of Motor
(v)	Heaters	2 sets for each type and rating of Motor
(vi)	Complete Set of Coupling	1 set for each type and rating of Motor
(vii)	Bearings (DE) for each type and rating of motors	2 sets for each type and rating of Motor
(viii)	Bearings (NDE) for each type and rating of motors	2 sets for each type and rating of Motor
(ix)	Cooling Fan Internal & External	1 set for each type and rating of Motor
(x)	Neutral CT for differential protection (For motor rating >1000 KW)	2 no of each type and rating.
(xi)	End Termination kits	2 Nos. of each type and rating
(xii)	Indicating Instruments/gauges other than Bearing temperature gauge (as applicable)	1 set for each type and rating of Motor
(xiii)	Phase side Bushing and Insulator	1Set for each type and rating of Motor
(xiv)	Oil Seal Ring (as applicable)	1Set for each type and rating of Motor
5.2	415 Volt Motor	
(i)	Motor of each type and rating (Note : motors covered in mechanical spare items need not to be included here again) 10% of the installed quantity or minimum 1 number whichever be higher	10% of the installed quantity or minimum 1 number whichever be higher
(ii)	End Shield Cover Driving & Non-Driving End	1 set for each type and rating of Motor
(iii)	Heaters	2 sets for each type and rating of motor
(iv)	Bearings (DE and NDE) for each type and rating of motor	2 sets
(v)	Cooling Fan for all type and rating of LT motors	One (1) set
(vi)	Dust seals and gaskets for each type of motors	1 Set
(vii)	Motor Terminal Block	1 no. for each type and rating of Motor
(viii)	Complete Set of Coupling	1 set for each type and rating
6	Local Control Station	
6.1	Local Control Station Complete Set for all type of drives	2 nos for each make, type and rating
6.2	Push button complete set	5 nos for each make, type and rating
	Control & Instrumentation	
7	Field Instrument	
7.1	Electronic Transmitters	
(i)	Pressure	1(One) no. complete set for each type and model/range used in the system
(ii)	Differential Pressure	1(One) no. complete set for each type and model/range used in the system
(iii)	Level	1(One) no. complete set for each type and model/range used in the system
(iv)	Speed	1(One) no. complete set for each type and model/range used in the system
(v)	FlowTransmitter	1(One) no. complete set for each type and model/range used in the system
(vi)	3-D Ultrasonic level Transmitter	1(One) no. complete set for each type and model/range used in the system
7.2	Different type of Switches	
(i)	Pressure Switch	2(two)no. of each type & model/range used in the system

Sl. No.	Equipment/Package Name	Quantity to be supplied for the Package
(ii)	Differential Pressure Switch	2(two)no. of each type & model/range used in the system
(iii)	Level Switch	2(two)no. of each type & model/range used in the system
(iv)	Flow Switch	2(two)no. of each type & model/range used in the system
(v)	Temperature Switch	2(two)no. of each type & model/range used in the system
(vi)	Dust Detector	1(one)no. of each type & model used in the system
7.3	Thermocouple	10% of each type and length used in one unit
7.4	RTD	10% of each type and length used in one unit
7.5	Thermo-well for both TC and RTD	2(Two) nos. for each type and rating/length used in the system
7.6	Solenoid Valve	
(i)	Complete Solenoid Valve Assembly	2Nos. for each type and rating used in the system
(ii)	Coil (single or double coil type)	10% of total nos. used in the system or minimum 5(five) Nos. whichever is more for each type and rating.
7.7	Different types of Gauge	
(i)	Pressure Gauge	10% of total nos. used in the system or minimum 1(one) no. whichever is more for each type and range.
(ii)	Differential Pressure Gauge	10% of total nos. used in the system or minimum 1(one) no. whichever is more for each type and range.
(iii)	Temperature Gauge	10% of total nos. used in the system or minimum 1(one) no. whichever is more for each type and range.
(iv)	Magnetic Level Gauge	10% of total nos. used in the system or minimum 1(one) no. whichever is more for each type and range.
7.8	Erection Hardware	
(i)	Transmitter's Manifold	10% of total nos. used in the system or minimum 2(Two) nos. whichever is more for each type, rating,/model and size used in the system.
(ii)	Impulse Line Root/Source valve	10% of total nos. used in the system or minimum 4(four) nos. whichever is more for each type, rating,/model and size used in the system.
(iii)	Impulse Line Isolation valve	10% of total nos. used in the system or minimum 4(four) nos. whichever is more for each type, rating,/model and size used in the system.
(iv)	Impulse Line Drain valve	10% of total nos. used in the system or minimum 4(four) nos. whichever is more for each type, rating,/model and size used in the system.
(v)	Impulse Line fittings	Each type/size 25Nos.
(vi)	Impulse Pipe	Each type/size 100Mtrs.
(vii)	Copper/SS Tube	Each type/size 100Mtrs.
(viii)	Fittings for Copper/SS Tube	Each type/size 100Nos.
7.9	Conductivity Type Level Switch	
(i)	Conductivity Ttype level Probes	10% of total nos. used in the system or minimum 4(four) nos. whichever is more.
(ii)	Complete Electronics unit	1Set
(iii)	Isolating/Root Valve	2Nos.

Sl. No.	Equipment/Package Name	Quantity to be supplied for the Package
8	Current/Voltage Transducers	1(one) no. each type/rating used in the system
9	MWatt/MVAR Transducer	1(one) no. each type/rating used in the system
13	Energy Chain	1 meter of each chain length with two sets of mounting brackets.
13.03.00	PLC System	
13.03.01	CPU Card	1No.
13.03.02	Communication Processor Module	1No. for each type
13.03.03	Binary Input Card	10% of total nos. used in the system or minimum 4(four) nos. whichever is more.
13.03.04	Pulse Input Card	10% of total nos. used in the system or minimum 1(one) no. whichever is more.
13.03.05	Analog Input Card (4 to 20 mA type)	10% of total nos. used in the system or minimum 2(two) nos. whichever is more.
13.03.06	Analog Input Card (TC input type)	10% of total nos. used in the system or minimum 2(two) nos. whichever is more.
13.03.07	Analog Input Card (RTD input type)	10% of total nos. used in the system or minimum 2(two) nos. whichever is more.
13.03.08	Binary Output Card for contact	10% of total nos. used in the system or minimum 4(four) nos. whichever is more.
13.03.09	Binary Output Card for Voltage (24VDC)	10% of total nos. used in the system or minimum 4(four) nos. whichever is more.
13.03.10	Pulse output Card	1No.
13.03.11	Analog Output Card (4 to 20 mA type)	10% of total nos. used in the system or minimum 2(two) nos. whichever is more.
13.03.12	Interposing Relay	10% of total nos. used in the system or minimum 4(four) nos. whichever is more.
13.03.13	Output Relay modules/ Relay Board & Auxiliary Relay	10% of total nos. used in the system or minimum 4(four) nos. whichever is more.
13.03.14	Bus End Modules	1No. for each type
13.03.15	Bus Extension Modules	1No. for each type
13.03.16	Bus Interfacing Card/Modules	1No. for each type
13.03.17	Prefab-cable with connector for CPU, Communication Card and I/O racks	1No. for each type
13.03.18	Networking Modules/Components	1No. for each type
13.03.19	Rack Mounted Power Supply Unit (SMPS or otherwise) for C	10% of total nos. used in the system or minimum 2(two) nos. whichever is more for each type and rating.
13.03.20	Non-rack Mounted Power Supply including Transformer	10% of total nos. used in the system or minimum 2(two) nos. whichever is more for each type and rating.
13.03.21	Any other system specific Module/Cards used in the system but not mentioned in this list	10% of total nos. used in the system or minimum 2(two) nos. whichever is more for each type and rating.
13.03.22	RAM Backup Battery	2 (two) nos.
13.03.23	MCB	1No. for each type and rating
13.03.24	Special Fuse for the Cards	Each type/rating of fuse, 25% of total nos. used in the system or minimum 25 nos. whichever is more.
13.03.25	MMI Unit	
(i)	21" TFT Monitor for the MMI Unit	1No.
(ii)	Key Board	1No.
(iii)	Mouse/ Trackball	2Nos.
13.03.26	UPS for PLC system (applicable for 5KVA rating or Bellow ,else Sl. No.7.11.00)	One Complete Set

Sl. No.	Equipment/Package Name	Quantity to be supplied for the Package
13.03.27	Micro PLC system (i.e. integrated CPU & I/O system, where above mentioned components are not applicable)	One Complete Set
14.01	UPS (PLC System)	(applicable only for above 3KVA rating, for UPS rating equal to or less than 3 KVA one complete set shall be supplied for each area.)
14.02	Semi-conductor Fuse/HRC Fuse	3 (Three) times of total quantity of each type of fuses used in the system
14.03	SCR (if applicable)	100% of total quantity of each type used in the system
14.04	Diode	100% of total quantity of each type used in the system
14.05	IGBT	100% of total quantity of each type used in the system
14.06	Electronic Module/ PCB	
(i)	Static Switch	2(two) Nos. each type of Electronic Card/PCB/modules used in the system
(ii)	Inverter	2(two) Nos. each type of Electronic Card/PCB/modules used in the system
(iii)	Static voltage Regulator	2(two) Nos. each type of Electronic Card/PCB/modules used in the system
(iv)	Charger	2(two) Nos. each type of Electronic Card/PCB/modules used in the system
14.07	UPS Battery (Ni-Cad Type)	
(i)	Battery Cell (Uncharged, Dry)	10Nos. each type
(ii)	Inter connecting cell strips	10Nos. each type
(iii)	Vent cap	10Nos. each type
(iv)	Hydrometer	1No.
(v)	Rubber gloves	1Pair
(vi)	Voltmeter for measuring cell voltage (Center zero type)	1No.
(vii)	Funnel	1No.
(viii)	Jug	1No.
(ix)	Apron & Goggles	1Set
(x)	Cell lifting puller	1No.
(xi)	Insulated socket spanner with handle	1No.
(xii)	Terminal screw with Belleville washer	5% of total quantity used
(xiii)	Plastic filling bottle	1No.
(xiv)	Thermometer	1No.
NOTE-1	If percentage comes as fraction next higher integer should be considered for the purpose of quantity required.	
NOTE-2	The mandatory spare list is tentative. Any item supplied by the bidder but is not included in mandatory spare list may be decided during detail engineering.	



**ANNEXURE#9
of
Wagon Tippler Package
for**

SAGARDIGHI THERMAL POWER PROJECT

1 x 660 MW UNIT NO. 5, PHASE – III

WEST BENGAL POWER DEVELOPMENT CORPORATION LIMITED

Content:

List of Drawings (LOD) with submission schedule to be submitted during detail engineering

LIST OF MINIMUM DRAWINGS WITH SUBMISSION SCHEDULE

Sl. No.	Discipline	DESCRIPTION	Submission of drawing by vendor	BHEL Document No.
1	MECH	GA OF WAGON TIPPLER COMPLEX	LOI+25 days	IS-1-GA-724-103-M083
2	MECH	GA DRAWING OF WAGON TIPPLER	LOI+20 days	IS-1-GA-724-103-M084
3	MECH	LOAD DATA & FOUNDATION DETAILS OF WAGON TIPPLER	LOI+20 days	IS-1-DS-724-103-M085
4	MECH	WAGON TIPPLER AND SAC TIMING	LOI+25 days	IS-1-GA-724-103-M086
5	MECH	OPERATIONAL WRITE UP FOR WAGON TIPPLER WITH SIDE ARM CHARGER	LOI+25 days	IS-4-OP-724-103-M087
6	MECH	POWER CALCULATION OF WT, WT CLAMPING & SAC	LOI+25 days	IS-4-DC-724-103-M088
7	MECH	GA DRAWING OF SIDE ARM CHARGER	LOI+10 days	IS-1-GA-724-103-M089
8	MECH	LOAD DATA & FOUNDATION DETAILS OF SIDE ARM CHARGER	LOI+15 days	IS-1-DS-724-103-M090
9	MECH	GA OF WAGON TIPPLER WITH SIDE ARM CHARGER	LOI+15 days	IS-1-GA-724-103-M091
10	MECH	GA OF INDEXER	LOI+10 days	IS-1-GA-724-103-M092
11	MECH	GA OF APRON & DRIBBLE FEEDER	LOI+30 days	IS-1-GA-724-103-M093
12	MECH	DESIGN CALCULATION OF APRON FEEDER	LOI+30 days	IS-4-DC-724-103-M094
13	MECH	DESIGN CALCULATION OF DRIBBLE FEEDER	LOI+30 days	IS-4-DC-724-103-M095
14	MECH	DATASHEET FOR DRIBBLE CONVEYOR BELT	LOI+40 days	IS-4-DC-724-103-M096
15	MECH	ARRANGEMENT & FOUNDATION DETAILS OF MECHANICAL STOPPER (TRACK STOP)	LOI+40 days	IS-3-GA-724-103-M097
16	MECH	GA & DATASHEET OF LINEAR ACTUATOR FOR WAGON TIPPLER	LOI+45 days	IS-4-GA-724-103-M098
17	MECH	GA & DATASHEET OF INTEGRATED WEIGH BRIDGE FOR WAGON TIPPLERS	LOI+38 days	IS-3-GA-724-103-M099
18	MECH	HYDRAULIC SYSTEM DRAWINGS FOR WAGON TIPPLER	LOI+58 days	IS-3-PI-724-103-M100
19	MECH	HYDRAULIC SYSTEM DRAWINGS FOR SIDE ARM CHARGER & INDEXER	LOI+58 days	IS-3-PI-724-103-M101
20	MECH	HYDRAULIC SYSTEM DRAWINGS FOR APRON FEEDER	LOI+58 days	IS-3-PI-724-103-M102
21	MECH	GA OF DISCHARGE CHUTE FROM APRON FEEDER	LOI+48 days	IS-1-GA-724-111-M107
22	MECH	CAPACITY CALCULATION FOR A/C SYSTEM IN WAGON TIPPLER CONTROL ROOM	LOI+58 days	IS-4-GA-724-111-M119
23	MECH	G.A. OF EOT CRANE	LOI+58 days	IS-3-GA-724-111-M072
24	MECH	DETAILS OF BOBCAT	LOI+43 days	IS-5-DS-724-111-M082
25	MECH	PAINTING SPECIFICATIONS	LOI+28 days	IS-4-SC-724-100-M147
26	MECH	O & M MANUALS	LOI+73 days	IS-4-OM-724-100-M148
27	MECH	PG TEST PROCEDURE	LOI+88 days	IS-4-QP-724-100-M149
28	MECH	FIELD QUALITY PLAN	LOI+80 days	IS-4-QP-724-100-Q001
29	MECH	INSPECTION PLAN FOR WT/SAC PKG	LOI+15 days	IS-4-QP-724-108-Q003
30	MECH	QAP FOR WAGON TIPPLER	LOI+25 days	IS-4-QP-724-103-Q006
31	MECH	QAP FOR SIDE ARM CHARGER & INDEXER	LOI+25 days	IS-4-QP-724-103-Q007
33	MECH	QAP FOR APRON FEEDER & DRIBBLE FEEDER	LOI+35 days	IS-4-QP-724-103-Q008
34	MECH	QAP FOR EOT CRANE	LOI+55 days	IS-4-QP-724-103-Q009
35	MECH	QAP OF HYDRAULIC POWER PACK FOR WAGON TIPPLER, SAC, INDEXER, APRON FEEDER	LOI+63 days	IS-4-QP-724-103-Q043
36	MECH	QAP OF HYDRAULIC CYLINDER FOR WAGON TIPPLER, SAC & INDEXER	LOI+63 days	IS-4-QP-724-103-Q044
37	ELEC	ELECTRICAL EQUIPMENT LAYOUT FOR WT & SAC CONTROL ROOM	LOI+90 days	IS-1-EE-724-103-E001

Sl. No.	Discipline	DESCRIPTION	Submission of drawing by vendor	BHEL Document No.
38	ELEC	CABLE TRAY AND EARTHING LAYOUT OF WT COMPLEX	LOI+90 days	IS-1-CL-724-103-E002
39	ELEC	CABLE TRAY AND EARTHING LAYOUT FOR WT & SAC CONTROL ROOM	LOI+90 days	IS-1-CL-724-103-E003
40	ELEC	GA, DATASHEET, TB DWGS, CHAR. CURVES OF LT MOTOR FOR WT & SAC MACHINE	LOI+90 days	IS-4-GA-724-103-E001
41	ELEC	GA, DATASHEET AND CATALOGUES OF FIELD DEVICES FOR WT & SAC MACHINE	LOI+90 days	IS-4-GA-724-103-E002
42	ELEC	GA, BOM, SCHEMES OF PLC FOR WT & SAC MACHINE	LOI+90 days	IS-4-GA-724-103-E003
43	ELEC	GA, DATASHEET OF UPS FOR WT & SAC MACHINE PLC	LOI+90 days	IS-4-GA-724-103-E004
44	ELEC	GA, SCHEMES OF CONTROL DESK FOR WT & SAC MACHINE	LOI+90 days	IS-4-GA-724-103-E005
45	ELEC	GA, DATASHEET, WIRING DIAGRAM OF LPBS FOR MACHINE PACKAGE	LOI+90 days	IS-4-GA-724-103-E006
46	ELEC	GA DRAWINGS, SCHEMES OF VFD PANEL FOR APRON FEEDER	LOI+90 days	IS-4-GA-724-103-E007
47	ELEC	GA ,BOM OF POWER & CONTROL JUNCTION BOXES FOR WT & SAC MACHINE PKG	LOI+90 days	IS-4-GA-724-103-E008
48	ELEC	GA ,BOM OF CONTROL JUNCTION BOXES FOR WT & SAC MACHINE PKG	LOI+90 days	IS-4-GA-724-103-E009
49	ELEC	WT & SAC MACHINE ELECTRICAL LOAD LIST	LOI+90 days	IS-4-MS-724-103-E001
50	ELEC	PLC CONFIGURATION WT & SAC MACHINE	LOI+90 days	IS-4-MS-708-103-E001
51	ELEC	PLC I/O LIST WT & SAC MACHINE	LOI+90 days	IS-4-IO-724-103-E001
52	ELEC	PLC LOGIC AND HMI SCREEN DIAGRAMS FOR WT & SAC MACHINE	LOI+90 days	IS-4-LD-724-103-E001
53	ELEC	POWER CABLE SCHEDULE WT & SAC MACHINE	LOI+90 days	IS-4-CS-724-103-E001
54	ELEC	CONTROL & INSTRUMENTATION CABLE SCHEDULE FOR WT & SAC MACHINE	LOI+90 days	IS-4-CS-724-103-E002
55	ELEC	QAP OF PLC FOR WT & SAC MACHINE	LOI+90 days	IS-4-QP-724-103-E001
56	ELEC	QAP OF UPS FOR WT & SAC MACHINE PLC	LOI+90 days	IS-4-QP-724-103-E002
57	ELEC	QAP OF CONTROL DESK FOR WT & SAC MACHINE	LOI+90 days	IS-4-QP-724-103-E003
58	ELEC	QAP OF LPBS FOR WT & SAC MACHINE	LOI+90 days	IS-4-QP-724-103-E004
59	ELEC	QAP OF LT MOTORS FOR WT & SAC MACHINE	LOI+90 days	IS-4-QP-724-103-E005
60	ELEC	QAP OF FIELD DEVICES FOR WT & SAC MACHINE	LOI+90 days	IS-4-QP-724-103-E006
61	CIVIL	WAGON TIPPLER : Excavation Drawing	LOI+50 days	IS-1-DG-843-103-C001
62	CIVIL	WAGON TIPPLER : Design of Underground Structure	LOI+50 days	IS-4-DC-843-103-C002
63	CIVIL	WAGON TIPPLER : GA Details of Plans & Elevations	LOI+50 days	IS-1-DG-843-103-C003
64	CIVIL	WAGON TIPPLER : RC Details of Raft	LOI+50 days	IS-1-DG-843-103-C004
65	CIVIL	WAGON TIPPLER : RC Details of Walls & Counterforts	LOI+50 days	IS-1-DG-843-103-C005
66	CIVIL	WAGON TIPPLER : RC Details of Floor Beams	LOI+50 days	IS-1-DG-843-103-C006
67	CIVIL	WAGON TIPPLER : RC Details of Hopper	LOI+50 days	IS-1-DG-843-103-C007
68	CIVIL	WAGON TIPPLER : RC Details Side Arm Charger	LOI+50 days	IS-1-DG-843-103-C008
69	CIVIL	WAGON TIPPLER : GA of Hopper Grating	LOI+50 days	IS-1-DG-843-103-C009
70	CIVIL	WAGON TIPPLER : Design of Shed	LOI+50 days	IS-4-DC-843-103-C010
71	CIVIL	WAGON TIPPLER : Sections and Elevation Details of Shed	LOI+50 days	IS-1-DG-843-103-C011
72	CIVIL	WAGON TIPPLER : Side Runners and Purlin Details of Shed	LOI+50 days	IS-1-DG-843-103-C012

Sl. No.	Discipline	DESCRIPTION	Submission of drawing by vendor	BHEL Document No.
73	CIVIL	WAGON TIPPLER : Design of Control Room	LOI+50 days	IS-4-DC-843-103-C013
74	CIVIL	WAGON TIPPLER : GA & RC Details of Control Room	LOI+50 days	IS-1-DG-843-103-C014
77	CIVIL	WAGON TIPPLER : Design of Powerpack Room	LOI+50 days	IS-4-DC-843-103-C015
78	CIVIL	WAGON TIPPLER : GA & RC Details of Powerpack Room	LOI+50 days	IS-1-DG-843-103-C016
79	CIVIL	WAGON TIPPLER : GA & RC Details of Grade Slab & Miscellaneous details.	LOI+50 days	IS-1-DG-843-103-C017
80	CIVIL	WAGON TIPPLER : GA & RC Details of prewetting system	LOI+50 days	IS-1-DG-843-103-C018

- Note:**
1. Delay in drawing submission will not be accountable for delivery extension of the project.
 2. Vendor shall strictly follow above mentioned drawing submission dates with respect to LOI (letter of Intent) of contract and should submit drawings within above mentioned schedules to meet project requirements like inputs to civil construction and supply of equipments.