



An ISO 9001
Company

Bharat Heavy Electricals Limited
(High Pressure Boiler Plant)
Tiruchirappalli-620 014, Tamil Nadu, India
Dept: MATERIALS MANAGEMENT/BOI

Annexure – A- Terms and Conditions

ACCEPTANCE OF TECHNO - COMMERCIAL TERMS AND CONDITIONS BY THE BIDDERS

Description of the Equipment:	SCR Catalyst Dedusting System	
Projects	Bhusawal 1x660MW Project	
BHEL Tender No. & Date	1802100149 dated 13.08.2021	
<i>To be filled by bidder</i>		
Name of the firm (Bidder)	:	
Address	:	
Contact details	<u>Contact person 1</u> Name: Designation: Office Phone: Mobile: e-mail: <u>Contact person 2</u> Name: Designation: Office Phone: Mobile: e-mail:	
Sl. No.	Terms and conditions	Vendor's confirmation
1 (a)	Technical: Supply of SCR Catalyst Dedusting System shall be as per the below mentioned specifications attached with the enquiry: 1. Specification TSR:006/rev01 2. Specification TSR:007/rev01 3. SCR - Key Diagram: 0-SR-000-00049 Rev. 03 4. De-Dusting system guarantee: SCR/DD/PG/001 Rev. 00. 5. P&ID of SCR reactor: 0-SC-288-90002 Rev. 01. 6. SCR Reactor arrangement: 1-5R-000-00005 Rev. 01. 7. P&ID for Ash Sweeper system: 3-SR-000-00006 Rev. 01. 8. P&ID for Sonic horn system : 3-SR-000-00005 Rev. 01 9. Valve schedule: SR/DD/1727/VALVE/001	
1 (b)	Pre-qualification requirement (PQR): Offer shall be considered only if bidder is meeting Tender Prequalification requirement (Annexure-B). Bidder to comply with Pre-Qualification requirement of the tender and submit along with their technical bid - the credentials and other documents as indicated in the PQR in the format prescribed. Otherwise their offer will get rejected.	

1 (c)	Evaluation method The tender will be evaluated on total package basis. Evaluation shall be on total landed cost to BHEL on FOR destination basis. Currency of evaluation shall be INR . Rate quoted in Foreign currencies will be converted to INR by multiplying with the Exchange rate (SBI TT Selling rate) as on the technical bid opening date. If the date of opening happens to be a bank holiday, then the forex rate as on previous bank (SBI) working day shall be taken.	
1 (d)	Vendor shall quote as per the enclosed price Schedule format only.	
1 (e)	Vendor offers will considered for price bid opening subject to fulfilment of techno commercial suitability and sub vendor approval by end customer. Previous supply credentials shall be submitted for taking up with customer for approval.	
1 (f)	Inspection by BHEL/ BHEL approved TPIA/Customer Bidder to submit Vendor Quality Plan (VQP) in case of ordering for approval.	
2 (a)	Firm Price: The quoted / finalised rates shall be Firm till execution of the supplies. Offer with PVC clause will not be considered.	
2 (b)	The Tender will be operated in two part bid system. One-part consisting of PQR, Technical bid with Commercial terms & conditions and other part is Price Bid. Based on the PQR compliance, technical suitability and sub vendor approval by end customer, vendors will be short-listed. The price Bid of short listed vendors will be opened on a suitable date with due intimation to vendors. Reverse Auction is not applicable for this tender.	
3 (a)	Delivery term: Indigenous Suppliers The quote shall be on FOR Bhusawal Project Site destination basis as indicated below inclusive of Packing, forwarding, Freight also to yours account. Transit Insurance is under BHEL scope @0.12%. Import Supplier: Import vendors to submit offers on CFR (Cost & Freight), Chennai port (LILO – Liner in Liner Out) basis for all the packages. Port of loading should be indicated without fail. Port of discharge should be Chennai.	
4 (a)	Payment terms: Indigenous Supplier (Non MSE) For Main supply and commissioning spares: Payment term is 100% direct payment after 60 days from the date of dispatch against site acknowledgement and against 10% PBG valid for the warranty period. For Mandatory spares: Payment term is 100% direct EFT payment after 60 days from the date of receipt and acceptance of materials and against 10% PBG valid for the warranty period.	

	Indigenous Supplier (MSE) Payment will be as per MSMED Act, 2006. Supplier quoting for MSME payment term should submit Udyam Registration Certificate along with Part-I bid.	
4 (b)	Import Supplier BHEL Payment term is 100% payment on CAD basis after 60 days from the date of receipt of documents, specified in PO, at BHEL bank against 10% PBG as per Sl. No. 4(d). Respective bank charges to respective account. If supplier insists for LC, only Usance LC with 60 days credit will be opened one month prior to material readiness, further loading @ 1.5% on the offered value will be considered. If Hence supplier shall intimate the material readiness accordingly for opening of L.C. LC validity period will be 90 days and for any extension, applicable charges will be to supplier's account.	
4 (c)	Loading Criteria No deviation is permitted in payment term. Any deviation on the above term is liable for rejection.	
4 (d)	Performance Bank Guarantee: Vendor shall guarantee the performance of the de-dusting system as per SCR/DD/PG/001. Vendor is liable for the performance of complete de-dusting system as a package inclusive of ash sweeper system and sonic horn system. BHEL require a performance Bank Guarantee to a value of 10% of supply value till the above performance is proved. The PBG shall be in BHEL format (Format attached) which is to be opened in any one of the banks mentioned under List of Consortium Banks attachment. All banks charges shall be to vendor account only. Any deviation on PBG may make the offer liable for rejection. Vendor shall submit the PBG valid minimum for guarantee/warranty period with additional claim period of three months, along with the submission of invoice and subsequently to be extended by vendor till the time of establishment of performance guarantee. All the extension charges shall be borne by vendor. MoM signed between vendor and BHEL Bhusawal site indicating achievement of guarantee parameters shall be submitted by vendor for release of PBG.	
5 (a)	Liquidated damages (LD): Delivery of the goods specified in the purchase order should be made within the time prescribed. Failure to dispatch the materials in the time as per the delivery quoted in our Purchase Order would make the supplier liable to an un-conditional LD at the rate of 0.5% of the total order value per week of the delay or part thereof subject to a maximum of 10% of the total order value. In case of PO placements, required documents have to be submitted for approval within 20 days from the date of PO & reply for any further clarification has to be within 7 days. Any delay beyond the above specified period will be considered during LD calculation. Under GST regime, BHEL has to discharge GST liability on LD	

	recovered from suppliers. Hence applicable GST shall also be recoverable from suppliers on LD amount. Debit note will be issued by BHEL for this amount, indicating the respective supply invoice number.	
5 (b)	Loading Criteria: LD / Penalty: Any deviation on BHEL LD / Penalty clause, loading (Basic material Value) will be applied to the extent to which it is not agreed by the bidder.	
6 (a)	Guarantee / Warranty Period: Vendor shall guarantee for design & manufacturing defects for a period of 12 months from the date of commissioning or 18 months from the date of supply whichever is earlier.	
6 (b)	Repair & replacements: Within the guarantee period vendor has to replace / rectify the defective/ damaged items on free of cost within a reasonable time of reporting from our end.	
6 (c)	Loading Criteria: Guarantee / Warranty Period: No Deviation is permitted. If still vendor offered any deviation on the Guarantee / warranty period, it may lead to rejection of offer.	
6 (d)	Erection and Commissioning support: Vendor shall submit optional offer for Supervision of erection and commissioning of the offered system inclusive of to & fro charges, incidentals, boarding & lodging at site. The Order for the same will be placed separately by BHEL Power sector. However, the above optional offer will be considered for price comparison. Lumpsum charges quoted for Supervision of erection and commissioning should not exceed 2% of the package value.	
7 (a)	Taxes & Duties: All Taxes, Duties etc. payable as extra to the quoted price should be specifically stated in offers along with CST & TIN No / Tariff No. etc., failing which the purchaser will not be liable for payment of such Taxes and Duties. Our TIN No. 33243560005, TNGST No. 3560005, CST. No. 239383 Dt. 11-06-1991 & BHEL ECC No. AAACB4146PXM012, Assessment circle Tiruverumbur. BHEL TRICHY Unit GST NO : 33AAACB4146P2ZL.	
7 (b)	Kindly indicate the GST No of your Firm	
7 (c)	Kindly Indicate the HSN Code for all items	
7 (d)	Please indicate the applicable GST % (IGST)	
8	Risk purchase: BHEL at its option will be entitled to terminate the contract and to purchase elsewhere at the risk and cost of the seller either the whole of the goods or any part which the supplier has failed to deliver or dispatch within the time stipulated as aforesaid or if the same were not available, the best and the nearest available substitute thereof. The supplier shall be liable for any loss which BHEL may sustain by reason of such risk purchases in addition to LD at the maximum rate mentioned in the LD clause above. Confirm your acceptance.	

	The value under Risk purchase clause shall be calculated as follows: Risk & Cost Amount= [(A-B) + (A x H/100)] Where, i. A= Value of Balance scope of Work/ Supply (*) as per rates of new contract ii. B= Value of Balance scope of Work/ Supply (*) as per rates of old contract being paid to the contractor/supplier at the time of termination of contract i.e. inclusive of PVC & ORC, if any. iii. H = Overhead Factor shall be taken as 5 In case (A-B) is less than 0 (zero), value of (A-B) shall be taken as 0 (zero). * Balance scope of work/ supply Difference of Tendered/Contract Quantities and Executed Quantities as on the date of issue of Letter for 'Termination of PO/Contract', shall be taken as balance scope of Supply for calculating risk & cost amount. Note: In case vendor fails to fulfil any of the PO / Contract obligations as per PO/Contract, PO/contract shall be cancelled and appropriate cost shall be deducted from the vendor's pending bills in BHEL Trichy (or) across the BHEL units.	
9	Delivery Period: 16 weeks from the Documents approval from Customer /BHEL. - Material shall be dispatched after obtaining dispatch clearance from BHEL.	
10	Invoice date/Bill of Lading date/Airway Bill date/Lorry way bill date/Railway Receipt date, whichever is later will be considered for LD calculation.	
11	Documents are to be submitted along with technical bid (Part-1) 01. Covering letter 02. Unpriced offer. 03. Filled technical specification 04. Filled BHEL Terms and condition sheet (Annexure-A) 05. Filled Pre-Qualification requirement (Annexure- B) along with supporting documents 06. Catalogue's 07. Detailed BOM of the package with weight details of each item. 08. Third party non-disclosure agreement 09. MSE documents (if applicable) 10. Make In India certification in attached format (if applicable) 11. All documents as per Sl. No. 2.12 of specification TSR: 006 and TSR:007 12. Filled up No deviation Format Documents are to be submitted along with Price bid (Part-2) 01. Priced offer as per the format attached with the enquiry. Note: All the pages of documents are to be signed and stamped by	

	authorized signatory of the company. Any query during enquiry stage shall be replied within three days failing which offer may be rejected as non-responsive.	
12	Offer Validity: 120 days minimum from techno commercial bid opening (Part-1)	
13	Inspection and testing requirements: Inspection and testing requirements are to be carried out as per the specification and BHEL/Customer approved Drawing, Technical spec &QP and all test certificates are to be submitted in complete set. Inspection notice period: For TPI inspector visit to vendor works, a minimum of 3 working days' notice period for indigenous vendors and 30 working days' notice period for import vendors is required well in advance from the proposed date of inspection.	
14	O & M manuals: BHEL require 1 sets of printed O & M manuals with 3 soft copies in CD-ROM at no cost to be sent to BHEL/ Trichy.	
15	Response to Tenders for Indigenous supplier will be entertained only if the vendor has a valid GST registration number which should clearly have mentioned in the offer. If any specific exemption is available, a declaration with due supporting documents need to be furnished for considering the offer.	
16	Supplier shall mention their GSTN registration number in all their invoices and invoices shall be in the format as specified/prescribed under GST laws. Invoices shall necessarily contain Invoice number (in case of multiple numbering system is being followed for billing like SAP invoice no, commercial invoice no etc., then the Invoice No which is linked/uploaded in GSTN network shall be clearly indicated), item description as per PO, Quantity, Rate, Value, applicable taxes with nomenclature (like IGST, SGST, CGST & UTGST) separately, HSN/ SAC Code, etc.	
17	All invoices shall bear the HSN Code for each item separately (Harmonized System of Nomenclature)/ SAC code (Services Accounting Code).	
18	Invoices will be processed only upon completion of statutory requirement and further subject to following: • Vendor declaring such invoice in Form GST ANX-1 • Receipt of Goods or Services and Tax invoice by BHEL	
19	As the continuous uploading of tax invoices in GSTN portal (in GST ANX-1) is available for all (i.e. both Small & Large) tax payers under proposed new GST Return System, all invoices raised on BHEL may be uploaded immediately in GST portal on despatch of material /rendering of services. The supplier shall ensure availability of Invoice in GST portal before submission of invoice to BHEL. Invoices will be admitted by BHEL only if the invoices are available in GSTN portal (in BHEL's GST ANX-2).	
20	In case of discrepancy in the data uploaded by the supplier in the GSTN portal or in case of any shortages or rejection in the supply, then BHEL will not be able to avail the tax credit and will notify the supplier of the same. Supplier has to rectify the data discrepancy in the GSTN portal or issue credit note or debit note (details also to be	

	uploaded in GSTN portal) for the shortages or rejections in the supplies or additional claims, within the calendar month informed by BHEL.	
21	In cases where invoice details have been uploaded by the vendor but failed to remit the GST amount to GST Department (Form PMT-08 or Form GST RET-01 to be submitted) within stipulated time, then GST paid on the invoices pertaining to the month for which GST return not filed by the vendor will be recovered from the vendor along with the applicable interest (currently 24% p.a) and all subsequent bills of the vendor will not be processed till filing of the GST return by the vendor	
22	In case GST credit is denied to BHEL due to non-receipt or delayed receipt of goods and/ or tax invoice or expiry of timeline prescribed in GST law for availing such ITC, or any other reasons not attributable to BHEL, GST amount claimed in the invoice shall be disallowed to the vendor.	
23	Where any GST liability arising on BHEL under Reverse Charge (RCM), the vendor has to submit the invoices to BHEL well within the timeline prescribed in GST Law, to enable BHEL to discharge the GST liability. If there is a delay in submission of invoice by the vendor resulting in delayed payment of GST by BHEL along with Interest, then such Interest payable or paid shall be recovered from the vendor.	
24	Under GST regime, BHEL has to discharge GST liability on LD recovered from suppliers/contracts. Hence applicable GST shall also be recoverable from suppliers/contractors on LD amount. For this Tax Invoice will be issued by BHEL indicating the respective supply invoice number.	
25	GST TDS will be deducted as per Section 51 of CGST Act 2017 and in line with Notification 50/2018 – Central Tax dated 13.09.2018. GST TDS certificate which will be generated in GST portal subsequent to vendor accepting the TDS deduction in the GST portal, will be issued to the vendor.	
26	A declaration to the effect that all invoice particulars are/were uploaded in the GSTN network/ portal & all tax liability as per GST rules and regulations have been and will be discharged, shall be mentioned in the invoice. If not mentioned in the invoice, a separate declaration shall be submitted as per the requirement of BHEL	
27	MSE VENDOR: <i>i. If L1 vendor is an MSE vendor entire project package will be ordered on L1 vendor.</i> <i>ii. If a Non MSE vendor is coming as L1, then L1 prices will be counteroffered on MSE vendor who is quoting price within the price band L1+15% and if they are agreeing, purchase order will be awarded for full/complete supply of total tendered value to MSE.</i> <i>iii. If more than one MSE vendors are available in the L1+15% price band then lowest of the MSE vendor will be selected for counteroffering. If lowest MSE vendor is not accepting it will be counteroffered to the next MSE vendor in the price band and so on.</i>	

	<i>iv. Finally if none of the MSE vendor in the price band is not accepting it will be ordered on L1 non MSE vendor.</i> Payment for MSE Indigenous vendors will be as per MSMED Act, 2006 MSE suppliers can avail the intended benefits only if they submit along with the offer, attested/notarized copy of <i>Udyam Registration certificate.</i> Non submission of such documents will lead to consideration of their bid at par with other bidders. No benefit shall be applicable for this enquiry, in case of any deficiency in the above required documents or in case the documents are not submitted before price bid opening. If the tender is to be submitted through e-procurement portal, then the above required documents are to be uploaded on the portal even if submitted earlier.	
28	<u>Make in India:</u> For this procurement, the local content to categorize a supplier as a Class I local supplier/ Class II local Supplier/ Non- Local supplier and purchase preference to Class I local supplier, is as defined in Public Procurement (Preference to Make in India), Order 2017 dated 04.06.2020 issued by DPIIT. In case of subsequent orders issued by the nodal ministry, changing the definition of local content for the items of the NIT, the same shall be applicable even if issued after issue of this NIT, but before opening of Part-II bids against this NIT. The local supplier at the time of tender, bidding or solicitation shall be required to provide self-certification that the item offered meets the minimum local content and shall give details of the location(s) at which the local value addition is made.	
29	<u>Packing Requirements (for indigenous vendors):</u> • Packing should ensure the healthiness of the Equipment including all electrical Accessories which may be stored for longer period (up to 2 years) at Site conditions (open to atmosphere). • All openings (Fluid, Pneumatic & Electric) shall be firmly capped. • Items shall be packed in suitable enclosure (to prevent damage/rusting due to Seashore atmospheric conditions) from all four sides and also it should be covered with polythene to make it water proof. • Packing and struts shall be used to arrest rolling of items and to avoid transit damage. • Limit switches and such components shall be encapsulated properly with suitable material like Thermocol. • Suitable arrangement (lugs/hooks) for loading and unloading of the equipment in packed condition at site. <u>Packing Requirements (for import vendors):</u>	

	Packing shall be sea worthy.	
	The preferred shipment mode “Containerized Cargo or Break Bulk” shall be specified clearly in the offer. <u>FOR CFR INCO TERMS – CONTAINERIZED CARGO</u> - For CFR terms, moved through CONTAINERS (Suppliers should clearly specify this in their offer) it would be presumed by BHEL that the freight charges quoted is on LILO (LINER IN LINER OUT) basis including extra charges, if any, like Container Imbalance Charges, Trade Imbalance charges or any other charges payable to the Liner. No other charges other than the quoted Freight rate will be paid by BHEL excepting applicable Terminal Handling Charges, Container cleaning Charges, DO charges to Shipping Liner at Discharge Port. 14 FREE DAYS FOR Container detention shall be provided. - In case of shipment through Containers on CFR basis, the BL should bear the endorsement that “14 free days for Container Detention is applicable”. <u>FOR BREAKBULK CARGO:</u> - For CFR terms, moved through BREAK BULK BASIS (Suppliers should clearly specify this in their offer) it would be presumed by BHEL that the freight charges quoted is on LILO (LINER IN LINER OUT) basis. - The materials will be Custom cleared from Port itself. <u>Important Information for Import Suppliers:</u> - Indian Customs has imposed a penalty on late filing of Bill of Entries (Air/Sea Shipments) by the importer. The maximum free time allowed is 24 hrs from the time of arrival of cargo at final port of discharge. At present penalty is Rs.5000/- per day (for Initial 03 days) & Rs.10000/- per day (thereafter). Hence the supplier shall submit the Non-Negotiable Documents (Bill of Lading, Commercial Invoice, Packing List, Certificate of Origin, etc.) either by email or post/courier to BHEL well before the landing of cargo at final port of discharge. - In case of any penalty due to late filing of Bill of entry for reasons attributable to suppliers (as listed below), the same will be recovered from the bills of supplier: - Non availability of Non-Negotiable Documents (NNDs) before the cargo arrival - Discrepancy in documents - Short landing of Consignments (For shipments on CFR– Chennai Port) - For all the shipments for the contracts (POs) finalized on CFR– Chennai Port basis, - Delivery Orders involving multiple agencies like liners/freight forwarders are not allowed. To avoid any delay, BHEL prefers	

	Single agency office at the final discharge Port (Chennai) for issuing the Delivery Order to BHEL. ○ The detention/demurrage charges arise due to the delay in collection of Delivery Orders from multiple agencies of liner/freight forwarder also whose offices are not at available Chennai, the same amount will be deducted from Supplier's bills. ○ Apart from the Terminal Handling Charges, Container cleaning Charges & Delivery Order Charges at final port of discharge, any other charges will not be borne by BHEL. ○ The liner/freight forwarders shall be informed by the Vendor not to claim any additional charges (like charges listed below) for issuing Delivery Order. In case if the liner/freight forwarder claims such charges, the same amount will be deducted from the Vendor bills with/without any prior intimation in order to avoid the delay in Customs clearance. The likely additional/hidden charges are listed below ○ CIC - Container Imbalance Charges/Surcharges ○ EIC - Equipment Imbalance Charge/Surcharges ○ CAF - Container/Currency Adjustment Factor ○ BAF - Bunker adjustment Factor ○ RDS - Rupee Depreciation Surcharge ○ CDS - Currency Depreciation Surcharge ○ PCS - Port Congestion Surcharge ○ LSS - Low Sulphur Surcharge ○ Devanning Charges <u>Transport Conditions for Import:</u> The Original Documents (Bill of Lading, Invoice, Packing List, Certificate of Origin & Test Certificate) shall reach BHEL well in advance before the vessel arrival. The soft copies of the above shall be forwarded to BHEL immediately after shipment. ○ 14 FREE DAYS for Container detention at final port of destination shall be provided and the same to be endorsed in the Bill of Lading. If there is no free day or less than 14 free days provided by the supplier, the actual cost incurred towards detention charges due to non-availability of above said free days will be recovered from the supplier Invoice. ○ In the event of delayed submission of documents/ non-submission of documents by the supplier as per the mutually agreed terms, an amount up to 5% of the invoice value will be retained towards detention/ demurrage & other charges and the difference if any between actual charges and recovery will be settled separately through supplementary invoice. ○ In such cases, the Supplier shall authorize the Steamer / Shipping agent / transporter to freely release the consignment	
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	to BHEL by providing a “Surrender Bill of Lading”. - Otherwise, No-objection Certificate shall be issued to the Liner, authorizing BHEL to get the Delivery Order without producing the Original Bill of Lading. - This is required to ensure avoidance of detention/ demurrage at Chennai Sea-port that may arise in case of delayed presentation of documents by the Seller.	
30	<u>Fraud Prevention Policy</u> Bidder along with its associate /collaborators /sub-contractors /sub-vendors / consultants / service providers shall strictly adhere to BHEL Fraud Prevention Policy displayed on BHEL website http://www.bhel.com and shall immediately bring to the notice of BHEL Management about any fraud or suspected fraud as soon as it comes to their notice.	
31	<u>Cartel Formation</u> All the firms should desist from forming cartel as the practice is prohibited under Section 3(3) (a) & (d) of the competition Act 2002. If any such instance is observed during this tender will attract disciplinary action as per BHEL policies.	
32	<u>Resolution of Disputes</u> The Parties agree that if at any time (whether before, during or after the arbitral or judicial proceedings), any Disputes (which term shall mean and include any dispute, difference, question or disagreement arising in connection with construction, meaning, operation, effect, interpretation or breach of the contract/tender which the Parties are unable to settle mutually), arise inter-se the Parties, the same may, be referred by either party to Conciliation to be conducted through Independent Experts Committee to be appointed by competent authority of BHEL from the BHEL Panel of Conciliators. The proceedings of Conciliation shall broadly be governed by Part-III of the Arbitration and Conciliation Act 1996 or any statutory modification thereof. Notes: 1. No serving or a retired employee of BHEL/Administrative Ministry of BHEL shall be included in the BHEL Panel of Conciliators. 2. Any other person(s) can be appointed as Conciliator(s) who is/are mutually agreeable to both the parties from outside the BHEL Panel of Conciliators. The proceedings of Conciliation shall broadly be governed by Part-III of the Arbitration and Conciliation Act 1996 or any statutory modification thereof and as provided in Annexure X to this Terms and conditions. The Annexure X together with its appendices will be treated as if the same is part and parcel hereof and shall be as effectual as if set out herein in this terms and conditions. Except as provided elsewhere in this Contract, in case amicable	

	settlement is not reached between the parties, in respect of any dispute or difference; arising out of the formation, breach, termination, validity or execution of the Contract; or, the respective rights and liabilities of the Parties; or, in relation to interpretation of any provision of the Contract; or, in any manner touching upon the Contract, then, either Party may, by a notice in writing to other Party refer such dispute or difference to sole arbitration of an arbitrator appointed as per the Arbitration and Conciliation Act, 1996 (India) or statutory modification or re-enactment thereof and the rules made thereunder and for the time being in force. The Arbitrator shall pass a reasoned award and the award of the Arbitrator shall be final and binding upon the parties. Subject as aforesaid, the provision of Arbitration & Conciliation Act 1996 (India) or statutory modification or re-enactment thereof and the rules made thereunder and for the time being in force shall apply to the arbitration proceeding under this clause. The seat of arbitration shall be Trichy, Tamil Nadu, India The cost of arbitration shall be borne as per the award of the Arbitrator. Subject to arbitration in terms of clause above, the Courts at Trichy, Tamil Nadu, India shall have exclusive jurisdiction over any matter arising out of or in connection with this Contract. Notwithstanding the existence or any dispute or difference and/or reference for the arbitration, the vendor shall proceed with and continue without hindrance the performance of its obligation under this Contract with due diligence and expedition in a professional manner except where the Contract has been terminated by either Party in terms of this Contract. <u>In Case of Contract with Public Sector Enterprise (PSE) or a Government Department, the following shall be applicable:</u> In the event of any dispute or difference relating to the interpretation and application of the provisions of commercial contract(s) between Central Public Sector Enterprises (CPSEs)/Port Trusts inter se and also between CPSEs and Government Departments/Organizations (Excluding disputes concerning Railways, Income Tax, Customs & Excise Departments, such dispute or difference shall be taken up by either party for resolution through AMRCD as mentioned in DPE OM No. 4(1)/2013 –DPE (GM)/FTS-1835 dated 22-05-2018.	
33	<u>Force Majeure clause</u> a. Notwithstanding the provisions contained in other clauses, the supplier shall not be liable for imposition of any such sanction so long the delay and/or failure of the supplier in fulfilling its obligations under the contract is the result of an event of Force Majeure. For purposes of this clause, Force Majeure means an event beyond the control of the supplier and not involving the supplier's fault or negligence and which is not foreseeable and not brought about at the instance of the party claiming to be affected by such event and which has caused the non – performance or delay in performance. Such	

	events may include, but are not restricted to, wars or revolutions, hostility, acts of public enemy, civil commotion, sabotage, fires, floods, explosions, epidemics, quarantine restrictions, strikes excluding by its employees, lockouts excluding by its management, freight embargoes and Acts of GOD. b. If a Force Majeure situation arises, the supplier shall promptly notify the Purchaser/Consignee in writing of such conditions and the cause thereof within twenty-one days of occurrence of such event. Unless otherwise directed by the Purchaser/Consignee in writing, the supplier shall continue to perform its obligations under the contract as far as reasonably practical, and shall seek all reasonable alternative means for performance not prevented by the Force Majeure event. c. If the performance in whole or in part or any obligation under this contract is prevented or delayed by any reason of Force Majeure for a period exceeding sixty days, either party may at its option terminate the contract without any financial repercussion on either side. d. In case due to a Force Majeure event the Purchaser/Consignee is unable to fulfil its contractual commitment and responsibility, the Purchaser/Consignee will notify the supplier accordingly and subsequent actions taken on similar lines described in above sub-paragraphs.	
Note	1. In the event of our customer order covering this tender being cancelled /placed on hold / otherwise modified, BHEL would be constrained to accordingly cancel / hold / modify the tender at any stage of execution. 2. BHEL may negotiate the L1 rate, if not meeting our budget / estimated cost. BHEL may re-float the tender opened, if L1 price is not acceptable to BHEL. Any deviation in specified commercial terms- Annexure-A, will lead to rejection of offer. 3. BHEL reserves its right to reject an offer due to unsatisfactory past performance by the respective Vendor in the execution of any contract to any BHEL project / Unit. 4. Any other Techno –Commercial Terms indicated by the vendor in their offer elsewhere will be ignored. BHEL will proceed with tender evaluation as per Annexure-A only.	

Annexure-B

Technical Pre-Qualification Requirement (PQR) for

SCR De-Dusting System

1. The vendor shall be an established SCR De-Dusting system supplier having adequate Engineering, Manufacturing, testing and servicing facilities and shall furnish technical backup documents in proof for above requirements. Offers from authorized representative of OEM is also acceptable. However, the above said conditions shall apply for OEM and backup documents shall be submitted in proof of the same. In addition, an authorization letter from the OEM shall be submitted as a proof of represent of the OEM.
2. The vendor shall have experience of having supplied De-Dusting system for high dust application as per the technical specification for SCR plants or application of similar severity. Supply reference list with details of PO, PO date, customer name and application shall be submitted.
3. The De-Dusting system offered shall be from the existing regular supply range of the vendor. Vendor shall provide the product catalogue.
4. Proven track record is required. Minimum One end user certificate for the satisfactory operational performance of their product supplied meeting requirements specified in enquiry specification or greater.
(or)
successfully executed two POs for same item meeting requirements specified in enquiry specification or greater.
Vendor to submit the corresponding datasheets / drawings / technical documents of supplied item as per end user certificate/PO's.
5. In case of ordering, the Vendor shall have the responsibility for the following and same to be confirmed point wise.
 - i) Vendor should have the component replacement responsibility in case of defect / failure.
 - ii) Experts from Vendor's side shall associate in commissioning activities at site, if required.
 - iii) Vendor should ensure the product performance during erection & commissioning and ensure performance guarantee.
6. Backup document checklist to meet PQR to the fullest satisfaction of BHEL. All documents shall be in English, if the original document is in other language, same shall be translated in English.

S. No	Document description	Check list
1	Documents to meet clause(1)	☐
2	Supply reference document (General reference list) to meet clause (2)	☐
3	Product Catalogues to meet clause (3)	☐
4	Min. one end user certificate (and) Two POs to meet clause (4)	☐
5	Confirmation to clause meet clause (5)	☐

BHARAT HEAVY ELECTRICALS LIMITED

TIRUCHIRAPPALLI-620 014

Fuel Systems/PE(FB)



Technical Purchase Specification for
ASH SWEEPER SYSTEM

Specification No.: **TSR:006**

Revision No.: 01

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	Name	Signature	Date
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2 Technical Specification

2.1 Scope

This specification defines the minimum requirements for the design, manufacture, testing, preparation for shipment and delivery of materials and engineering documentation and start-up service (support for erection and commissioning) for this equipment. Supplier is solely responsible for correct design, engineering, and supply of their scope of supply.

The offering, based on recommendations from the Supplier, shall employ Ash Sweepers located as mutually established so as to avoid major stiffeners and structure but so as to effectively clean the entire cross section area and volume of each catalyst level so equipped.

In the event of conflicts between codes, standards, and this specification, customer specification of this document, the more stringent requirements shall apply and the conflict between these specifications shall be submitted to BHEL in writing and should obtain BHEL's prior approval.

2.2 Equipment, Materials and Services by Supplier

The Supplier's scope of supply includes, but is not necessarily limited to:

- a. Ash Sweeper system utilizing plant compressed air to clean the top of each catalyst layer for each SCR reactor; The required quantity of ash sweepers for each reactor shall be determined by the Supplier.
- b. Equipment and ancillaries as defined in datasheets of Ash Sweeper Selection, P&ID's, and General Arrangement Drawings of this document.
- c. Supplier shall include mounting plates/rings or tubes (as required, one for each Ash Sweeper), pre-drilled and tapped and/or weld-prepped, with all required fasteners and hardware. No welding to the ash sweepers is permitted. Blanking plates for ash sweepers of future layers.
- d. An ASME pressure vessel, relief valve, piston valve assembly, high temperature nozzle preferably fan jet nozzle, aircraft grade safety cable, Solenoid valve, mounting plates/ rings tubes pre-drilled and tapped, fasteners and two flexible hoses for each ash sweeper, blanking plates for ash sweepers of future layers.
- e. Drawings and documents showing loads, forces, centres of gravity (pick points), required structural bracing, and other technical details necessary for a safe, robust installation



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- f. Operating procedure explaining ash sweeper operational practice and suggested sequence manuals and instructions for storage, installation, commissioning, operating and maintenance
- g. Equipment datasheets, completely filled by the Supplier, in order to inform BHEL as to the specifics of the equipment being supplied
- h. Special tools required; For example, if a special lifting device is required during shop fabrication or handling, the device must be available on the construction site for installing that piece of equipment.
- i. Schedule for specific deliverables and required dates
- j. De dusting system Erection drawings with BOM
- k. Ash sweeper system design shall include compressed air supply piping and DCS controls for all ash sweeper including future layer ash sweepers with the initial design itself to facilitate future tie-in for the spare catalyst layer. Receiver tank, fasteners, valves and other accessories required for the future layer shall be designed and supplied for this specification. Supplier to design and supply equipment in full where in only future layer ash sweepers will be ordered to make the system complete.

2.3 Equipment, Materials and Services by Others

The scope of supply by others shall be:

- Unloading and storage at site
- Installation Testing, field performance monitoring, and inspections (Supplier to witness and assist as necessary)
- Utility systems piping up to terminal point
- Monorails and hoists
- Compressed air interconnecting piping to the Supplier's supplied equipment up to terminal point
- Structural support steel
- Insulation
- Electrical wiring, conduits, trays, push buttons and starters external to Supplier supplied equipment.
- DCS controls and remote alarms
- Instruments PG/PI, PIT/PT's and PDT/PDIT's are in BHEL scope as marked by terminal points and shown in P&ID for sonic horn system in reference drawings.
- Ash sweepers in Future layer

2.4 Performance Guarantees

The equipment provided by the Supplier shall operate in accordance with the performance data in the datasheet(s) included herewith.

The equipment shall meet all applicable codes and standards requirements.



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BHEL and/or Owner may conduct field tests during start up and after commercial operation of the installation for a period determined by the terms and conditions of purchase.

Total air consumption rate (including that of sonic horn) shall not exceed the instantaneous and averaged hourly rates as specified by the supplier as per guarantee clause No.05.

The Supplier shall fully cooperate with BHEL and Owner in defining a system test procedure.

This test procedure shall consider individual ash sweeper performance, grouped or otherwise, both in the cold SCR and hot flue gas conditions. Monitoring of SCR system pressure drop criteria shall be determined in advance. Catalyst surface cleanliness criteria shall be determined based on SCR operating procedures and observations of dust accumulation accounting for operating time and fuels being fired. The Supplier's test procedure shall be mutually agreed upon by the concerned parties including, but not limited to, Supplier, BHEL and Owner, and Owner's Engineer.

The System must ensure operational cleanliness and performance of the SCR catalyst without any damage or deterioration of the catalyst and its ancillary equipment.

2.5 Detailed Requirements of Equipment

2.5.1 General

The SCR reactor is designed and operated with flue gas having high dust concentrations.

The flue gas conditions and fuel data for the resultant ash/dust, etc. are as defined in the specifications included in Sections 5 clause 5.2 of TSR:007.

Air discharge shall be by piston valves controlled by solenoid valves. A spring return shall aid in piston closure and sealing after discharge.

The design shall prevent the ash sweeper from accidentally operating as a result of an abnormal drop in supply air pressure.

Each ash sweeper shall include an isolation slide gate installed in the blow pipe and an aircraft grade safety cable to prevent the pressure vessel from falling further than 1.5 meters should it become detached from the nozzle or blow pipe.

Supplier shall include mounting plates/rings or tubes (as required, one for each Ash Sweeper), pre-drilled and tapped and/or weld-prepped, with all required fasteners and



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hardware. No welding to the ash sweepers is permitted. Blanking plates for ash sweepers of future layers.

Supplier must provide Material Safety Data Sheets (MSDS) for all coatings, paints, lubricants, preservatives, or chemicals that will be brought onto site by the Supplier for whatever reason. The MSDS must be submitted before equipment is delivered on the site.

Piping material shall be stainless steel as per ASTM A312 Gr304.

Supplier shall provide a detailed description of any special lifting and/or installation requirements.

2.5.2 System Air Supply

In order for the Ash Sweeper System to operate properly and safely under normal and expected conditions, the Supplier shall provide BHEL with complete data for the requirements of the Air Supply (see also datasheets in Section 5, to be completed by Supplier):

- Required air pressure (Kg/cm²(g))
- Required air flow rate during normal operation of the Ash Sweeper System (Nm³/hr)
- Acceptable moisture limit in the air supply. Vendor shall note the quality of service air requirement as per annexure and has to supply required equipment to handle the said service air quantity.
- Acceptable range of oil and particulate material
- Measures needed to avoid freezing, damage, or failure of the System

2.5.3 Instrumentation and Controls

Supplier shall provide necessary details & write up for integration of controls into the BHEL/ Owner's DCS. Ash Sweeper operation shall be synchronized with that of the sonic horn system. Instruments and controls must be sourced from suppliers on the Owner's Approved Suppliers List.

2.6 Industry Reference Documents (Codes and Standards)

At a minimum, all work performed and materials provided by the Supplier must be in accordance with all applicable Centre, State and local laws, ordinances, and regulations. The equipment will comply with the applicable portions of the following Codes and Standards.



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The applicable revision of each of these Codes and Standards will be the current edition with addenda or the edition adopted by the controlling jurisdiction at the time of the purchase order.

In the event of a conflict between these documents and the specification, the Supplier shall submit a written request for an interpretation by BHEL. In general, the most stringent requirement shall govern.

Following are few standards.

- American National Standard Institute (ANSI)
- American Society of Testing and Materials (ASTM)
- American Society of Mechanical Engineers (ASME)
- American Petroleum Institute (API)
- Air Moving & Control Association (AMCA)
- Environmental Protection Agency (EPA)
- Institute of Electrical and Electronic Engineers (IEEE)
- Insulated Power Cable Engineers Association (IPCEA)
- International Organization for Standardization (ISO)
- Steel Structures Painting Council (SSPC)
- National Electrical Code (NEC)
- National Electrical Safety Codes (NESC)
- National Electrical Manufacturer's Association (NEMA)
- National Fire Protection Agency (NFPA)
- American Welding Society (AWS)
- American Institute of Steel Construction (AISC)
- Occupational Safety and Health Administration (OSHA)
- Joint Industrial Conference (JIC)
- Instrument Society of America (ISA)
- Bureau of Indian Standards (IS)

2.7 Operating procedure / duration

A operating procedure shall be provided by the Supplier to define the operating parameters of the system including the function of each piece of equipment, sounding intervals/durations, control devices, and instrumentation. This narrative shall form a basis to instruct and train plant personnel.

Precise P&ID's, and complete equipment/system operating and maintenance instructions/manuals provided in accordance with this specification shall complement this narrative.

2.8 Surface Preparation and Painting

As Per Manufacturer's Standard for outdoor installation and painting as applicable to project.



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2.9 Tagging Requirements

Mechanical equipment, motors, electrical equipment, control panels, valves, and instruments shall be tagged.

2.10 Field Service

At the request of BHEL, Supplier shall furnish a Field Engineer to provide technical assistance during construction/installation and commissioning.

BHEL will give Supplier sufficient notice prior to the site requirement for field service. Supplier stipulations that require a field service engineer or technician, such as inspection prior to equipment start up, shall be indicated in writing.

2.11 Spare Parts

Supplier shall include Start-up spare parts in the base pricing.

Supplier shall provide an option price for 5-year operating spare parts.

Supplier must supply a Start-up Spare Parts List and a 5-year Operating Spare Parts list in Excel format.

2.12 Documents to be submitted along with the offer

- a) Filled in data sheets
- b) Point wise compliance to the specification
- c) Deviations to the specification (if any) shall be clearly spelt out in detail.
- d) Overall dimensional assembly drawing for the selected variant along catalogues, drawings and O&M manuals.
- e) Cross sectional drawing with parts and materials identified with ash sweeper assembly details.
- f) Full designation with description of the designation codes for the selected variant.
- g) Relief valve dimensional drawing, data sheet and selection criteria.

2.13 Documents to be submitted after placement of order

Following documents shall be submitted along with the supplies.

- a) Functional write up
- b) Equipment training manual
- c) O&M instruction in soft version
- d) Dimensional drawing
- e) Cross section drawing with material identification and ash sweeper assembly details and Data sheets
- f) Erection drawings along with BOM clearing all the interferences in boiler and SCR for BHEL review. BHEL will provide necessary General arrangement and floor plan drawings for preparation of erection drawings.



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2.14 Packing

- All opening shall be firmly capped against ingress of water or dust.
- Shall be seaworthy packed in wooden boxes with water proof under cover for export jobs and road worthy packing for inland jobs.
- Liberal packing material & struts shall be used to arrest rolling & to protect from transit damages.

2.15 Marking

Stainless steel name plates with following boldly engraved shall be firmly fixed to the body with Maker's name & production serial number, tag number and Ash sweeper designation.

2.16 Guarantee

Vendor shall guarantee for design & manufacturing defects for a period of 12 months from the date of commissioning or 18 months from the date of supply whichever is earlier.

Vendor shall guarantee the performance of the de dusting system as per Clause 2.4 of this specification and annexure De-dusting system/performance guarantee.

3 Attachments and Reference Documents

3.1 Datasheets

Document No.	Description
Refer 5.0	Ash Sweeper selection
	Flue Gas Conditions (attached along with TSR:007)

3.2 Reference Drawings

Refer enclosures

4 Customer Specifications, Attachments, and Reference Documents

4.1 Customer Specifications & data sheets

Nil

4.2 Reference Drawings

Nil



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5 Ash Sweeper selection and Datasheet

		ASH SWEEPER SELECTION	
		Owner / Client: MAHAGENCO	Customer Number: 1727
		Datasheet	
Confidential	Data Revision Date	Plant: BHUSWAL TPS	
		Unit No: #6	
See NOTICE below	...	Location: MAHARASHTRA	
NOTICE: This document and the information, design, and material contained and/or illustrated herein (hereinafter "proprietary material"), is the property of COMPANY and is submitted, lent, and furnished to recipient in strict confidence with the express understanding that the recipient shall not reproduce, copy, loan, dispose of, or disclose to anyone outside recipient's organization, directly or indirectly, or use said proprietary material for any purpose other than that for which it is furnished and submitted by COMPANY. Recipient by receiving said proprietary material agrees to these terms, not to use the proprietary material in any way injurious to the interests of COMPANY, and to return the same upon request by COMPANY.			

5.1	GENERAL INFORMATION	
5.1.1	Equipment Name:	Ash Sweeper System
5.1.2	Quantity:	64 (Present) + 32 (Future)#
5.1.3	Tag Number(s):	AS#1 to AS# 64 \$
5.1.4	Indoor/Outdoor:	Outdoor
	REFERENCE DOCUMENTS	
5.1.5	0-SR-056-00049	P&ID Key Diagram
5.1.6	0-SR-500-00006	P&ID for ash sweeper system
5.1.7	0-SC-288-90002	P&ID of SCR reactor system
5.1.8	1-SR-000-00005	SCR reactor arrangement for de dusting system
5.1.9	0-SR-500-00005	P&ID for sonic horn system
5.1.10	Valve list	SR/DD/1727/valve/001

Provision for future is required including valves, pipes and necessary accessories making the system complete except ash sweepers.

\$ - Vendor to Confirm

5.2	PERFORMANCE DATA	Units	Value / unit
	Number of Units	No.	1
5.2.1	Number of reactors per unit	No.	2
5.2.2	Reactor designations per unit	-	A,B
5.2.3	Number of levels of ash sweepers per reactor	No.	3 (2 Present +1 Future)
5.2.4	Number of ash sweepers per level per reactor	No.	16\$
5.2.5	Total number of ash sweepers per reactor	No.	Present : 32\$ + Future :16\$
5.2.6	Total of ash sweepers per unit	No.	Present : 64\$ + Future :32\$



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5.2.7	Reactor size (inside casing dimensions) (D _R XW _R)	mm x mm	12682x 16772
5.2.8	Configuration (sweeper placement per level: front wall / rear wall / side walls)	--	Front wall, Rear wall
5.2.9	Flue Gas Dust Loading	g/Nm ³ (Max)	80.1
5.2.10	Low Dust or High Dust SCR	--	High Dust SCR
5.2.11	Fuel / Type of Coal	--	Worst Coal with 25% Excess Air
5.2.12	Verification System Required	Yes / No	No
5.2.13	Pining material		*

\$ - Vendor to confirm

*- Vendor to fill

5.3	REQUIREMENTS FROM BHEL TO ASH SWEEPER SUPPLIER TO MEET PERFORMANCE GUARANTEES				
5.3.1	Requirement	Units	Value	Coverage (% Of Surface)	Deviation
5.3.2	Gas velocity distribution at catalyst inlet	%	±10	80	Deviation from Mean
5.3.3	Gas velocity distribution at catalyst inlet	%	±20	100	Deviation from Mean
5.3.4	No substantial accumulation of popcorn ash is deposited on catalyst surface				
NOTE	All ash sweepers are supplied and installed at the start of the project except Future layer ash sweepers.				

5.4	DESIGN CRITERIA	Units	Value
5.4.1	Required air pressure	Kg/cm ² (Gauge)	*
5.4.2	Required air flow rate when operating	Nm ³ /h	*
5.4.3	Required Air Quality Class as per ISO 8573-1	solids.water.oil	*
5.4.4	Interval between sweeper blasts	minutes	*
5.4.5	Area of coverage per sweeper	depth/width	*
5.4.6	Reaction thrust when a sweeper is fired	kg	*

5.5	CONSTRUCTION	Units	Value
5.5.1	ASME Pressure Vessel Size	L	*
5.5.2	ASME Pressure Vessel Material	material	*
5.5.3	Safety Cable Length	m	*
5.5.4	Safety Cable Material	material	*
5.5.5	Ash Sweeper Valve Type	-	*



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5.5.6	Mounting components & blanking plates to allow future mounting in spare /future catalyst layer	Number	Required/ Not required
5.6	Solenoid Valve Details	Units	Value
5.6.1	Solenoid Valve rating	V	24V DC
5.6.2	Solenoid valve Make & Model	-	*
5.6.3	End Connections	Inch	*
5.6.4	Body material	-	*
5.6.5	Single/Dual	single	*
5.6.6	Insulation class	Class H	*
5.6.7	Enclosure	IP65	*
5.7	Relief Valve Details	Units	Value
5.7.1	Relief valve Set pressure	Kg/cm ²	*
5.7.2	Make & Model	-	*
5.7.3	End connection details	-	*
5.7.4	Relief valve GA Drawing	-	*
5.7.5	Nozzle type	-	*

*- Vendor to fill

5.8	Hoses	Units	Value
5.8.1	Number of Hoses per Ash sweeper assembly	No	*
5.8.2	Hose End connections	-	*
5.8.3	Hose Make and Model	-	*
5.8.4	Hose GA drawing	-	*



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6 ANNEXURE- A

BHEL APPROVED VENDOR LIST FOR SCR DE-DUSTING SYSTEM

Sl.no	Component/ equipment		Vendor
1	Sonic horns	a)	Integrated Global Services
		b)	Clyde Bergemann
		c)	Martin Engineering Company India Private
2	Ash Sweepers (Air Cannons)	a)	Integrated Global Services
		b)	Martin Engineering

NOTE 1 : Vendor list to be submitted for BHEL review along with credentials.

NOTE 2 : All applicable components, electrical equipment and accessories which are part of the skid shall have PESO/CCOE certification and the same to be provided to BHEL.

NOTE 3: Any other alternate vendor shall be subjected to BHEL approval on submission of credentials to the fullest satisfaction of BHEL.

BHARAT HEAVY ELECTRICALS LIMITED

TIRUCHIRAPPALLI-620 014

Fuel Systems/PE(FB)



Technical Purchase Specification for
SONIC HORNS SYSTEM

Specification No.: **TSR:007**

Revision No.: 01

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Rev. No.	Rev. Date	Clause	Description	Chd.	Appd.

	Name	Signature	Date
Prepared	Preetam kumar	-Sd-	04-09-2019
Checked	V Shankar Naik	-Sd-	05-09-2019
Approved	G. Saravanakumar	-Sd-	06-09-2019



Specification for SONIC HORNS SYSTEM

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2 TECHNICAL SPECIFICATION

2.1 Scope

This specification defines the minimum requirements for the design, manufacture, testing, preparation for shipment and delivery of materials and engineering documentation, for this equipment. The supplier is solely responsible for correct design, engineering and supply of their scope of supply including support for erection and commissioning.

The offer shall be based on supplier recommendations, employ sonic horns at appropriate location, as mutually established so as to avoid major stiffeners and structure but so as to effectively clean the entire cross section area and volume of each catalyst level. In the event of conflicts between codes, standards, and this specification, customer specification the more stringent requirements should apply and the conflict between these specifications shall be submitted to BHEL in writing.

In the event of conflicts between specification, datasheets & contract specific requirements the following order is to be considered for the system design.

1. Contract specific requirement.
2. Datasheets.
3. Technical purchase specification.

2.2 Equipment, Materials and Services by Supplier

The Supplier's scope of supply includes, but is not necessarily limited to:

- Equipment and ancillaries are as defined in datasheet Sonic Horn Selection, P&ID, and General Arrangement Drawings located in Section 5 of this document.
- 75 Hz Acoustic Horns - Straight Design.
- 75 Hz Acoustic Horns - Curved Design
- Air receiver tank
- De dusting system Erection drawings with BOM
- Mounting Rings or Tubes and Blank-off Plates (including fasteners) for future installation of additional acoustic horns, if applicable.
- All solenoid air valves, with associated bleed and block hand valves, pressure regulators, flexible hoses, air filters, Air receiver tank, and all other ancillary sub-equipment.
- System P&ID defining scope of supply, terminating points, piping, equipment, and instrumentation.
- Narrative explaining horn operational practice and suggested sequence.
- Manuals and instructions for storage, installation, commissioning, operating and maintenance.
- Equipment data sheets are to be completed by the Supplier in order to inform BHEL about the equipment being supplied.



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- Special tools required. For example, if a special tool is required during shop fabrication or handling, the device must be available on the construction site for installing that piece of equipment.
- Sonic horn system design shall include compressed air supply piping and DCS controls for all sonic horns including future layer sonic horns with the initial design itself to facilitate future tie-in for the spare catalyst layer. Receiver tank, fasteners, valves and other accessories required for the future layer shall be designed and supplied for this specification. Supplier to design and supply equipment in full where in only future layer sonic horns will be ordered to make the system complete

2.3 Equipment, Materials and Services by Others

- The scope of supply by others shall be:
- Unloading and storage at site
- Installation
- Testing, field performance monitoring, and inspections (Supplier to witness/assist)
- Utility systems piping up to terminal point
- Monorails and hoists
- Compressed air interconnecting piping to the Supplier's supplied equipment up to terminal point.
- Structural support steel
- Insulation
- Electrical wiring, conduits, trays, push buttons and starters external to Supplier supplied equipment
- DCS controls and remote alarms
- Instruments PG/PI, PIT/PT's and PDT/PDIT's are in BHEL scope as marked by terminal points and shown in P&ID for ash sweeper & sonic horn system in reference drawings.
- Ash sweepers in Future layer

2.4 Performance Guarantees

The equipment provided by the Supplier shall operate in accordance with the performance data in the datasheet(s) included herewith.

The equipment shall meet all applicable code requirements so that all required inspections are passed and permits obtained.

BHEL and/or Owner may conduct field tests during start-up and after commercial operation of the installation for a period determined by the terms and conditions of purchase. With the boiler unit operating as mentioned in SCR/DD/PG/001 and the SCR in operation, the Supplier's sonic horn equipment shall be guaranteed to maintain the total pressure loss across each installed catalyst layer at a value no greater than as specified in SCR/DD/PG/001. The increase in pressure



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loss must be measured over a twenty-four (24) hour period of continuous operation of the SCR system. Supplier may expect that no significant accumulation of LPA (Large Particle Ash) is deposited on catalyst surfaces.

Total air consumption rate shall not exceed the instantaneous and averaged hourly rates as specified by the supplier on the data sheet in section 5 clause 5.4.04. Also the total air consumption of ash sweepers and sonic horns put together shall be below the values mentioned in the De-dusting system/ performance guarantee SCR/DD/PG/001.

The catalyst surface shall be free of accumulations of dust/ash that would harm or cause loss of catalyst performance.

The operating horn performance and operating sequence chosen by Supplier shall not be less than 125dB at any point in the reactor.

The Supplier shall fully cooperate with BHEL and Owner in defining a system test procedure. This test procedure shall consider individual horn performance, grouped or otherwise, both in the cold SCR and hot flue gas conditions. Monitoring of SCR system pressure drop criteria shall be determined in advance. Catalyst surface cleanliness criteria shall be determined based on SCR operating procedures and observations of dust accumulation accounting for operating time and fuels being fired. The Supplier's test procedure shall be mutually agreed upon by the concerned parties including, but not limited to, Supplier, BHEL and Owner.

The System must ensure operational cleanliness and performance of the SCR catalyst without any damage or deterioration of the catalyst and its ancillary equipment.

2.5 Detailed Requirements of Equipment

2.5.1 General

The SCR facility is designed and operated with flue gas having high dust concentrations. The flue gas conditions and fuel data for the resultant ash/dust, etc. are as defined in Section 5.

The Supplier shall include mounting plates/rings or tubes (as required, one for each sonic horn), pre-drilled and tapped and/or weld-prepped, with all required fasteners and hardware. No welding to the horn sections is permitted.

The Supplier shall provide mounting components and blanking plates to allow future mounting of additional sonic horns on the spare layers of the SCR if specified in datasheets.

The horn driver diaphragm shall be proven and is to be made of Supplier's standard material for the service and be replaceable with the reactor in service.



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The Supplier shall ensure that the Supplier's standard horn materials are suitable for the service. Generally, the outboard section(s) of the horn will be of Supplier selected cast iron and the inner section(s) of stainless steel. All sections shall be securely bolted to form an integral unit. If a longitudinal weld is required in the fabricated stainless steel section of the horn the weld shall have no re-entrant angles, and be of a regular profile both longitudinally and laterally with no undercut or concavity.

An insulated enclosure will be fabricated by BHEL to attenuate noise and to prevent corrosion due to a combination of condensation and ash plugging in the horn.

The Supplier must provide Material Safety Data Sheets (MSDS) for all coatings, paints, lubricants, preservatives, or chemicals that will be brought onto the site by the Supplier for whatever reason. The MSDS must be submitted before equipment is delivered on the site.

The Supplier shall provide a detailed description of any special lifting and/or installation requirements.

Vendor shall provide mounting details required for the Air receiver tank. The required fasteners shall be in the scope of supplier.

2.5.2 System Air Supply

In order for the Sonic Horn System to operate properly and safely under normal and expected conditions, the Supplier shall provide BHEL with complete data for the requirements of the Air Supply (see also datasheets Sonic Horn Selection in Section 5, to be completed by Supplier):

- Required air pressure (Kg/cm²(g)).
- Required air flow rate when operating (Nm³/hr).
- Acceptable moisture limit in order to avoid freezing.
- Acceptable range of oil and particulate content.
- Measures needed to avoid freezing, damage or failure of the System.

The air receiver tank shall be included in the Supplier's scope of supply and it must have an ASME stamp and be sized correctly for all the acoustic horns on each reactor (one receiver per reactor). Each receiver shall include inlet and outlet nozzles, pressure relief valve, pressure gauge connection/stub as applicable, and manual drain valve.

2.5.3 Terminal Points

The Supplier shall furnish all equipment and services necessary to connect the equipment to the BHEL's system. Connections will include, but are not limited to the following as required by this specification:

- Refer attached P&ID for terminal points.
- Line mounted instruments shall be under the scope of supply of BHEL / Vendor as marked by terminal point.



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- Supplier shall identify detail terminal points and applicable services in their proposal.

2.5.4 Instrumentation, equipment and valves

Supplier shall provide the valves as per BHEL valve schedule and specification. However, supplier shall provide the list and supply instruments, equipment and valves to make the system complete.

Also vendor to provide the complete P&ID equipment, valves, instruments in line with BHEL P&ID's in excel and drawing formats in the offer stage itself.

2.5.5 Pipe, Valves, and Fittings

The Supplier shall provide all equipment as per terminal point scope. The piping class shall be 300.

Flexible pipe connections to the sonic horns shall be stainless steel flex hose having threaded connections.

Piping material shall be stainless steel as per ASTM A312 Gr304.

2.6 Industry Reference Documents (Codes and Standards)

At a minimum, all work performed and materials provided by the Supplier must be in accordance with all applicable Centre, State and local laws, ordinances, and regulations.

The equipment will comply with the applicable portions of the following Codes and Standards. The applicable revision of each of these Codes and Standards will be the current edition with addenda or the edition adopted by the controlling jurisdiction at the time of the purchase order. In the event of a conflict between these documents and the specification, the Supplier shall submit a written request for an interpretation by BHEL. In general, the most stringent requirement shall govern.

- American National Standard Institute (ANSI)
- American Society of Testing and Materials (ASTM)
- American Society of Mechanical Engineers (ASME)
- American Petroleum Institute (API)
- Air Moving & Control Association (AMCA)
- American Gear Manufacturers Association (AGMA)
- Anti-Friction Bearing Manufacturers Association (AFBMA)
- Bureau of Indian Standards (IS)
- Environmental Protection Agency (EPA)
- Institute of Electrical and Electronic Engineers (IEEE)
- Insulated Power Cable Engineers Association (IPCEA)
- International Organization for Standardization (ISO)
- Steel Structures Painting Council (SSPC)
- Hydraulic Institute (HI)
- National Electrical Code (NEC)



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- National Electrical Safety Codes (NESC)
- National Electrical Manufacturer's Association (NEMA)
- National Fire Protection Agency (NFPA)
- American Welding Society (AWS)
- American Institute of Steel Construction (AISC)
- Occupational Safety and Health Administration (OSHA)
- Joint Industrial Conference (JIC)
- Instrument Society of America (ISA)

2.7 Operating Sequences/Duration

An operating procedure shall be provided by the Supplier to define the operating parameters of the system including the function of each piece of equipment, sounding intervals/durations, control devices, and instrumentation. This operating procedure shall form a basis to instruct and train plant personnel.

Precise P&ID's, and complete equipment/system operating and maintenance instructions/manuals provided in accordance with this specification shall complement this narrative.

2.8 Surface Preparation and Painting

Project specific painting or Manufacturer's Standard whichever is applicable.

2.9 Field Service

At the request of the BHEL, Supplier shall send a Field Engineer to provide technical assistance during construction/installation and commissioning free of cost.

BHEL will give Supplier sufficient notice prior to the site requirement for field service.

Supplier stipulations that require a field service engineer or technician, such as inspection prior to equipment start up, shall be indicated in writing.

2.10 Spare Parts

The Supplier shall provide a list of recommended spare parts including start-up and commissioning spares and special tools, with and without pricing, and a schedule of part replacements based on the operation and service conditions specified.

2.11 Operation and Maintenance Manual

The operation and maintenance instructions must be supplied with manuals or cut sheets for all purchased components, plus sufficient specific equipment information to accomplish the following:



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Proper identification of the equipment, including nameplate data where applicable.
Proper handling and storage on-site prior to installation and commissioning.
Proper installation.
Performance and necessary pre-operation conditioning or checkout and test.
Safe and successful initial and subsequent operation.
Proper maintenance, by describing schedule and activity.
Proper lubrication, by providing lubrication schedule, lubricant specifications, and alternates.
Proper calibration, both initial and after prolonged usage.
Proper ordering of parts, components, and sub-assemblies, by supplying appropriate identification and ordering information.
Proper spare parts inventory.
Equipment checks and tests, by supplying performance curves, charts, etc., as applicable.

2.12 Documents to be submitted along with the offer

- a) Filled in data sheets
- b) Point wise compliance to the specification
- c) Deviations to the specification (if any) shall be clearly spelt out in detail.
- d) Overall dimensional assembly drawing for the selected variant along catalogues, drawings and O&M manuals.
- e) Cross sectional drawing with parts and materials identified with sonic horn assembly details.
- f) Full designation with description of the designation codes for the selected variant.
- g) Relief valve dimensional drawing, data sheet and selection criteria.

2.13 Documents to be submitted after placement of order

Following documents shall be submitted along with the supplies.

- a) Functional write up
- b) Equipment training manual
- c) O&M instruction in soft version
- d) Dimensional drawing
- e) Cross section drawing with material identification and sonic horn assembly details and Data sheets.
- f) Erection drawings along with BOM clearing all the interferences in boiler and SCR for BHEL review. BHEL will provide necessary General arrangement and floor plan drawings for preparation of erection drawings.

2.14 Packing

- a) All opening shall be firmly capped against ingress of water or dust.



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- b) Shall be seaworthy packed in wooden boxes with water proof under cover for export jobs and road worthy packing for inland jobs.
- c) Liberal packing material & struts shall be used to arrest rolling & to protect from transit damages.

2.15 Marking

Stainless steel name plates with following boldly engraved shall be firmly fixed to the body with Maker's name & production serial number, tag number and sonic horn designation.

2.16 Guarantee

Vendor shall guarantee for manufacturing defects for a period of 12 months from the date of commissioning or 18 months from the date of supply whichever is earlier.

Vendor shall guarantee the performance of the de dusting system as per performance guarantee SCR/DD/PG/001.



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3 Attachments and Reference Documents

3.1 Datasheets

Document No.	Description
Sub section of Section 5.0	Sonic horn selection and Data sheets
1	General information
2	Performance data
3	Requirements from BHEL to sonic horn supplier to meet performance guarantees
4	Design criteria
5	Construction
6	Filter
7	Receiver tank
8	Sonic horn performance guarantee (required of the seller)



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4 Customer Specifications, Attachments, and Reference Documents

4.1 Customer Specifications & data sheets

Nil

4.2 Reference Drawings

Nil



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5 Sonic Horn Selection and Data Sheets

		SONIC HORN SELECTION	
		Owner / Client: MAHAGENCO	Customer Number: 1727
Confidential	Data Revision Date	Plant: BHUSAWAL	Data Sheets
		Unit No: #6	
	See NOTICE below	...	

NOTICE: This document and the information, design, and material contained and/or illustrated herein (hereinafter "proprietary material"), is the property of COMPANY and is submitted, lent, and furnished to recipient in strict confidence with the express understanding that the recipient shall not reproduce, copy, loan, dispose of, or disclose to anyone outside recipient's organization, directly or indirectly, or use said proprietary material for any purpose other than that for which it is furnished and submitted by COMPANY. Recipient by receiving said proprietary material agrees to these terms, not to use the proprietary material in any way injurious to the interests of COMPANY, and to return the same upon request by COMPANY.

5.1	GENERAL INFORMATION	
5.1.1	Equipment Name	Sonic Horn
5.1.2	Quantity	*
5.1.3	Tag Number(s)	SH"XX" to SH"YY"
5.1.4	Indoor/Outdoor:	Outdoor
	Reference documents	Drawing / document number
5.1.5	SCR – Key Diagram	0-SR-000-00049
5.1.6	P&ID for ash sweeper system	3-SR-500-00006
5.1.7	P&ID SCR System	0-SC-288-90002
5.1.8	SCR Reactor arrangement	1-SR-000-00005
5.1.9	P&ID for sonic horn system	3-SR-500-00005
5.1.10	Valve list	SR/DD/1727/valve/001

* - Vendor to fill



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5.2 PERFORMANCE DATA

		Units	Value / unit
5.2.1	Number of Units	No	1
5.2.2	Number of reactors per unit	No	2
5.2.3	Reactor designations per unit	A / B / C / D, etc.	A,B
5.2.4	Number of levels of horns per reactor	No	3 (2 Present + 1 Future) #
5.2.5	Number of horns per level per reactor	No	8 ^{\$}
5.2.6	Total number of horns per reactor	No	16 ^{\$} Present + 8 ^{\$} Future #
5.2.7	Total of horns (per unit)	No	32 ^{\$} Present + 16 ^{\$} Future #
5.2.8	Reactor size (inside casing dimensions)	mm x mm	12682 X 16772
5.2.9	Configuration (horn placement per level: front wall, rear wall, north, south, other)	--	Left Side Wall, Right Side Wall
5.2.10	Arrangement type (bell section "C" inside reactor, flush mounted, or other)	--	*
5.2.11	Advocated horn type (straight, curved, or other)	--	Straight
5.2.12	Thermal Wrap	Yes / No	No
5.2.13	Verification System	Yes / No	No
5.2.14	Flue Gas Dust Loading	g/Nm ³	80.1
5.2.15	Low Dust or High Dust SCR	--	High Dust SCR
5.2.16	Fuel / Type of Coal		As furnished below
5.2.17	Mounting components & blanking plates to allow future mounting in spare catalyst layer	Number	Required/ Not required

\$ - Vendor to confirm

* - Vendor to fill

- Provision for future is required including valves, pipes and necessary accessories making the system complete except sonic horns.



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5.2.16 COAL PROPERTIES

DESCRIPTION (Source / Type)	UNIT	Indigenous coal			
		DESIGN COAL (Washed)	WORST COAL (3500kcal/kg HHV)	RANGE	New Worst COAL (3200 kcal/kg HHV) \$
PROXIMATE ANALYSIS					
Fixed carbon	% by wt	28.83	25.50	24-30	25
Volatile matter	% by wt	26.61	21.30	20-30	20
Moisture (Total)	% by wt	10.80	12.00	6-13	12
Ash	% by wt	33.76	41.20	30-43	43
Total	% by wt	100	100	100	100
HHV	kcal / kg	3731	3500	3300-4000	3200
ULTIMATE ANALYSIS					
Carbon	% by wt	40.34	35.87	30-45	35.71
Hydrogen	% by wt	2.61	2.66	2.5-4.0	2.07
Sulphur	% by wt	0.70	0.60	0.5-0.7	0.75
Nitrogen	% by wt	0.97	0.72	0.4-1.5	0.57
Oxygen (difference)	% by wt	10.82	6.95	Upto 12	5.90
Moisture	% by wt	10.80	12.00	6-15	12
Ash	% by wt	33.76	41.20	30-43	43
HARD GROVE INDEX					
		55	50	45-60	50
ASH CHARACTERISTICS					
IT - Initial deformation temp.	°C	1160	1100	1050-1250	
ST - Softening temp. H = W	°C	-	-	-	
HT - Hemispherical temp. = W / 2	°C	1200-1300	1150-1300	1150-1350	
FT - Fusion temp.	°C	1400	1400	1350-1450	
ASH CONSTITUENTS					
A - Si O2	% by wt	61	58	57.2-63.8	
A - Al2 O3	% by wt	29.2	31	26.7-31.8	
B - Fe2 O3	% by wt	5	7	2.0-7.2	
B - CaO	% by wt	1.5	1.5	1.1-1.6	
D - MgO	% by wt	0.4	0.8	0.4-1.0	
B - Na2 O	% by wt	0.12	0.12	0.12	
B - K2 O	% by wt	0.4	0.4	0.4	
A - TiO2	% by wt	1.5	1.0	1.0-1.5	
P2O5	% by wt	0.8	0.2	0.2-0.8	
SO3	% by wt	Trace	Trace	Trace	



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5.2.14 Flue gas conditions

As furnished below

Sl. No.	Description	Unit	TMCR DC	BMCR NWC	50% TMCR DC
			Guarantee Point	Design Point	Min Operating Point
1.	Flue Gas flow	t/h	2460	2740	1282
2.	Volumetric Gas Flow (wet-dust free)	Nm ³ /s	537	601	280
3.	Flue Gas temperature	°C	334	346	314
4.	Pressure at Eco outlet	mmWc	-107	-121	-60
5.	Flue gas constituents, Wet Basis - % by weight				
	i. CO ₂	% by wt	21.539	21.250	21.539
	ii. N ₂	% by wt	68.591	68.842	68.591
	iii. SO ₂	% by wt	0.204	0.243	0.204
	iv. Moisture	% by wt	6.220	6.203	6.220
	v. O ₂	% by wt	3.446	3.461	3.466
	vi. HCl (wet basis)	ppm	--	--	--
	vii. HF (wet basis)	ppm	--	--	--
6.	O ₂ (dry vol. basis)	%	3.548	3.560	3.548
7.	Inlet Particle dust conc. (wet)	gm/Nm ³	54.1	80.1	54.1



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REQUIREMENTS FROM BHEL TO SONIC HORN SUPPLIER TO MEET PERFORMANCE

5.3 GUARANTEES

5.3.1	Requirement	Units	Value	Coverage (% Of Surface)	Deviation
5.3.2	Gas velocity distribution at catalyst inlet	%	±10	80	Deviation from Mean
5.3.3	Gas velocity distribution at catalyst inlet	%	±20	100	Deviation from Mean
5.3.4	No substantial accumulation of popcorn ash is deposited on catalyst surface				

NOTES:

- 1) Insulation by BHEL.
- 2) All sonic horns are supplied and installed at the start of the project.

5.4	DESIGN CRITERIA	Units	Value
5.4.1	Frequency	Hz	*
5.4.2	Noise level	dB	*
5.4.3	Required air pressure	Kg/cm ² (Gauge)	*
5.4.4	Required air flow rate when operating	Nm ³ /hr	*
5.4.5	Recommended Receiver Size (one per reactor)	Litre	*
5.4.6	Allowable oil particle size	Microns	*
5.4.7	Maximum oil content within ambient operating temperature range	PPM	*
5.4.8	Allowable solid particle size	microns	*
5.4.9	Allowable solid particle content	PPM	*
5.4.10	Allowable dew point	°C	*
5.4.11	Interval between horn soundings	minutes	*
5.4.12	Duration of horn sounding	seconds	*
5.4.13	Area of coverage per horn	depth/width	*
5.4.14	Total catalyst surface area to be cleaned by the horns	m ²	*
5.4.15	Life of titanium diaphragm	hours	*
5.4.16	Piping material		*

5.5	CONSTRUCTION	Units	Value
5.5.1	Sound generator diaphragm construction		*
5.5.2	Diaphragm material		Titanium alloy [§]
5.5.3	Diaphragm thickness		*
5.5.4	Diaphragm thickness tolerance		*
5.5.5	Diaphragm diameter		*



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5.5.6	Diaphragm diameter tolerance		*
5.5.7	Bell section "A" material (ASTM number & grade)	ASTM number & Grade	*
5.5.8	Bell section "B" material (ASTM number & grade)	ASTM number & Grade	*
5.5.9	Bell section "C" material (ASTM number & grade)	ASTM number & Grade	*
5.5.10	Mounting assembly material (ASTM number & grade)	ASTM number & Grade	*
5.5.11	Minimum size casing opening for the mounting arrangement		*
5.5.12	Flange gasket material		*
5.5.13	Gasket for driver required	(Y / N)	*

5.6	Filter	Units	Value
5.6.1	Quantity	No	2
5.6.2	Filter Type	-	*
5.6.3	Allowable DP across filter	Kg/Cm2	*
5.6.4	Make	-	*
5.6.5	Model	-	*
5.6.6	Size	-	*
5.6.7	End Connection Details	-	*

5.7	Receiver Tank	Units	Value
5.7.1	Size	-	*
5.7.2	Hyd Test pr.	-	*
5.7.3	GA drawing number with Foundation details	-	*
5.7.4	Make of Relief valve	-	*
5.7.5	Model of relief Valve	-	*

* - Vendor shall fill.

\$ - Vendor to confirm



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6 ANNEXURE-A

BHEL APPROVED VENDOR LIST FOR SCR DE-DUSTING SYSTEM

Sl.no	Component/ equipment		Vendor
1	Sonic horns	a)	Integrated Global Services
		b)	Clyde Bergemann
		c)	Martin Engineering Company India Private
2	Ash Sweepers (Air Cannons)	a)	Integrated Global Services
		b)	Martin Engineering

NOTE 1 : Vendor list to be submitted for BHEL review along with credentials.

NOTE 2 : All applicable components, electrical equipment and accessories which are part of the skid shall have PESO/CCOE certification and the same to be provided to BHEL.

NOTE 3: Any other alternate vendor shall be subjected to BHEL approval on submission of credentials to the fullest satisfaction of BHEL.

TERMINAL POINT 'TP1'

	MEDIUM	NO	NB	FLOW	PR	TEMP
1	LIQUID NH3	1	80	20403	11.5	27
2	VAPOUR NH3	1	40	282	12	27

TERMINAL POINT 'TP2' (3 nos)

	MEDIUM	NO	NB	FLOW	PR	TEMP
1	NITROGEN	1	25	3	7	27
2	POTABLE WATER	1	25	4750	3.5	33

TERMINAL POINT 'TP3' (2 nos)

	MEDIUM	NO	NB	FLOW	PR	TEMP
1	SERVICE AIR	1	50	215	7	27

TERMINAL POINT 'TP4'

	MEDIUM	NO	NB	FLOW	PR	TEMP
1	SERVICE WATER	1	80	9000	6	33

TERMINAL POINT 'TP5'

	MEDIUM	NO	NB	FLOW	PR	TEMP
1	WASTE WATER	1	80	10000	-	-

TERMINAL POINT 'TP6'

	MEDIUM	NO	NB	FLOW	PR	TEMP
1	POTABLE WATER	1	100	23750	3.5	27

TERMINAL POINT 'TP8'

	MEDIUM	NO	NB	FLOW(f)	PR(p)	TEMP(t)
1	SULPHURIC ACID	1	25	510	-	AMB

TERMINAL POINT 'TP9'

	MEDIUM	NO	NB	FLOW(f)	PR(p)	TEMP(t)
1	FIRE PROTECT. WATER	1	80	100000	6	27

TERMINAL POINT 'TP10'

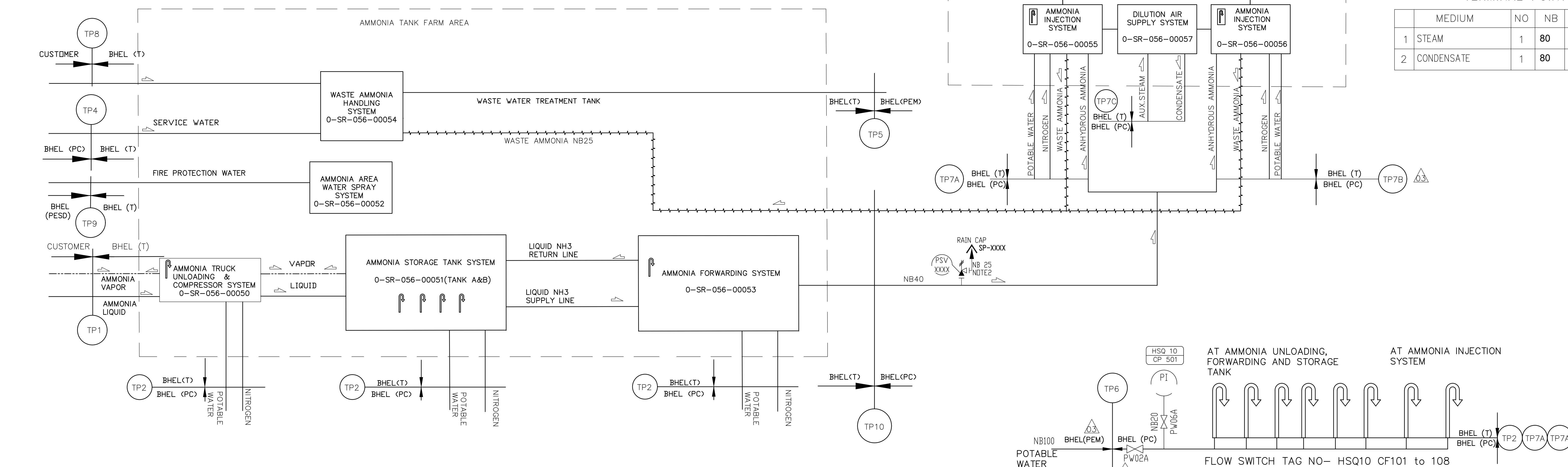
	MEDIUM	NO	NB	FLOW	PR	TEMP
1	WASTE AMMONIA	1	25	-	-	27
2	LIQUID AMMONIA	1	40	442	17.5	27

TERMINAL POINT 'TP7A & TP7B'

	MEDIUM	NO	NB	FLOW(f)	PR(p)	TEMP(t)
1	NITROGEN	2	25	3	7	27
2	POTABLE WATER	2	25	4750	3.5	27
3	LIQUID AMMONIA	1	40	442	17.5	27
4	WASTE AMMONIA	2	25	-	-	27

TERMINAL POINT 'TP7C'

	MEDIUM	NO	NB	FLOW(f)	PR(p)	TEMP(t)
1	STEAM	1	80	1000	16	290
2	CONDENSATE	1	80	1000	16	201



REFERENCE DRAWINGS FOR P&ID

- 0-SR-056-00050 P&ID of SCR system - Ammonia truck unloading system
- 0-SR-056-00051 P&ID of SCR system - Ammonia storage system tank A&B
- 0-SR-056-00052 P&ID of SCR system - Ammonia area water spray system
- 0-SR-056-00053 P&ID of SCR system - Ammonia Forwarding system
- 0-SR-056-00054 P&ID of SCR system - Waste ammonia handling systems
- 0-SR-056-00055 P&ID of ammonia injection system reactor A
- 0-SR-056-00056 P&ID of ammonia injection system reactor B
- 0-SR-056-00057 P&ID of dilution air supply system
- 0-SR-056-00058 P&ID for catalyst de-dusting System

NORMAL LINE PARAMETERS ARE IN,

p' = PRESSURE IN Kg/Sq.CM(g) f' = FLOW IN NCu.M/hr FOR AIR, NITROGEN.

t' = TEMPERATURE IN DEG.C.

AMB = Ambient

f' = FLOW IN Kg/hr. FOR AMMONIA, ACID, WATER & STEAM.

NOTES

- THE FLOWS INDICATED ARE INTERMITTENT EXCEPT AT TP3. STEAM & DILUTION AIR TO SCAPH AND AMMONIA TO REACTOR ARE CONTINUOUS.
- AMMONIA PSV/DRAIN/ISOLATION VALVES SHALL BE PROVIDED IN AMMONIA SUPPLY AS WELL AS WASTE AMMONIA LINES BY BHEL (PC). FOR THE QTY. AND EXACT LOCATION SEE THE PIPING LAYOUT DRG BY BHEL (PC).

3. PIPE SCHEDULE :
PIPE SPECIFICATION - SA210 GrA1 OR SA106 GrB OR SA106 Gr C
- | | |
|---------------------|-----------------------|
| NB10 - 14 x 2 | NB80 - 88.9 x 5.49 |
| NB15 - 21.34 x 2.77 | NB100 - 114.3 x 6.02 |
| NB25 - 33.4 x 3.38 | NB150 - 168.27 x 7.11 |
| NB40 - 48.26 x 3.68 | NB200 - 219.07 x 6.35 |
| NB50 - 60.32 x 3.91 | |

VALVES

OPEN	CLOSED	GATE VALVE	MANIFOLD (3 VALVE)

PIPING SYMBOLS

ACTUATORS AND REGULATORS

DIAPHRAGM ACTUATOR	PNEUMATIC ACTUATOR

FLOW ELEMENTS

ORIFICE
ROTAMETER
AVERAGING PITOT
MAGNETIC FLOW METER
DENSITY METER
VENTURI
THERMAL MASS FLOW METER
CORIOLIS FLOW METER
VORTEX FLOW METER
INDICATES SLOPED LINE
SPEC BREAK
SCOPE LINE
SKID BOUNDARY
TERMINAL POINT

CONTROL VALVE DESIGNATION LEGEND

TYPICAL CONTROL VALVE TAG NUMBER

CONTROL VALVE TYPE
CONTROL VALVE NO.
SYSTEM (AMMONIA UNLOADING)
SEQUENTIAL NO.

CONTROL VALVE TYPES

ZV CONTROL VALVE - DIVERT
FCV FLOW CONTROL VALVE (SELF-CONTAINED)
FV FLOW CONTROL VALVE
FV FLOW CONTROL VALVE
LV LEVEL CONTROL VALVE
PSV PRESSURE SAFETY VALVE (SELF-CONTAINED)
PSV PRESSURE SAFETY VALVE (SELF-CONTAINED)
PV PRESSURE CONTROL VALVE
TV TEMPERATURE CONTROL VALVE (SELF-CONTAINED)
TV TEMPERATURE CONTROL VALVE

FAILURE MODE
FC FAIL CLOSED
FO FAIL OPEN
LP LOCK OPEN
LO LOCK OPEN

TAG NUMBER CONVENTION

INSTRUMENT DESIGNATION LEGEND

TYPICAL INSTRUMENT TAG NUMBER

UNIT NO. (OPT.)
INSTRUMENT TYPE
SYSTEM
SEQUENTIAL NO.

AU AMMONIA UNLOADING SYSTEM
AW AMMONIA WATER SPRAY SYSTEM
AW AMMONIA WATER SPRAY SYSTEM
AW AMMONIA WATER SPRAY SYSTEM
AW AMMONIA WATER SPRAY SYSTEM
AW AMMONIA WATER SPRAY SYSTEM
AW AMMONIA WATER SPRAY SYSTEM
AW AMMONIA WATER SPRAY SYSTEM

EQUIPMENT & EQUIPMENT TRIM

	MOTOR		DUPLEX STRAINER
	AGITATOR		Y-STRAINER
	RAIN CAP		STRAINER
	BASKET STRAINER		CONE STRAINER
	EQUIPMENT NOZZLE		EMERGENCY EYEWASH AND SHOWER
	BUTTERFLY DAMPER		
	AIR VENT		
	AUTO DRAIN		
	GUILLOTINE DAMPER		
	FILTER		

PIPE FITTINGS

	REDUCER, ECCENTRIC FLAT ON BOTTOM
	SPRAY NOZZLE
	EXPANSION JOINT/FLEX CONNECTOR
	COUPLING
	TEST CONNECTION
	CERAMIC SPOOL PIECE

LINE SYMBOLS

	CONNECTION TO PROCESS LINE		HYDRAULIC COMMUNICATION
	CAPILLARY TUBE		ULTRA SONIC OR RADAR
	MECHANICAL LINK		UNDEFINED
	ELECTRIC		WASTE DRAIN
	ELECTRIC BINARY		WASTE AMMONIA
	PNEUMATIC		
	PNEUMATIC BINARY		
	ELECTRO MAGNETIC OR SONIC		

EQUIPMENT DESIGNATION LEGEND

TYPICAL EQUIPMENT TAG NUMBER

UNIT NO. (OPT.)
EQUIPMENT TYPE
SYSTEM (AMMONIA UNLOADING)
SEQUENTIAL NO.

EQUIPMENT TYPES

ABS ABSORBER	FDR FEEDER	PMP PUMP
ACU AIR CONDITIONING UNIT	FLT FILTER	PNL PANEL
AGI AGITATOR	FR FILTER REGULATOR	RAPP RAPPER
AS AIR SLIDE	FRN FURNACE	RCK RACK
BLW BLOWER	FXH FLEX HOSE	RCK RECEIVER TANK
CLS CLASSIFIER	GR GEAR REDUCER	SB SODT BLOWER
CMP COMPRESSOR	HTR HEATER	SH SHOWER
CNV CONVEYOR	HX HEAT EXCHANGER	SIL SKID
CRS CRUSHER	INJ INJECTION NOZZLE	SIL SILENCER
DMP DAMPER	JBX JUNCTION BOX	SP PIPE SPECIALTY
DOS DOSAGE ROLLER	LFA LFA	STC STEAM COIL
DRM DRYER	MIL MILL	STR STRAINER
EDU EVAPORATOR	NZL NOZZLE	TNK TANK
EXP EXPANSION JOINT	PJF PULSATON DAMPER	TRP TRAP
FAN FAN	PJF PULSE JET FABRIC FILTER	VBF VACUUM BELT FILTER
		VFD VARIABLE FREQUENCY DRIVE
		VIB VIBRATOR

REFERENCE ARROWS

PIPE SERVICE
OFF-DRAWING PIPING CONNECTOR
DESTINATION DRAWING NO.

PIPE SERVICE
ON-DRAWING PIPING CONNECTOR
SOURCE DRAWING NO.

CUSTOMER NO.: 1727

REV 03 DATE 07.03.2021 ALTERED : BALAJI_D

CHD & APPD : SHANKAR_NAIK

ZONE SCOPE CLARITY UPDATED.

REV 02 DATE 20.05.2020 ALTERED : BALAJI_D

CHD & APPD : SHANKAR_NAIK

ZONE SCOPE CLARITY UPDATED.

REV 01 DATE 26.08.2019 ALTERED : VIKAS_SETHI

CHD & APPD : SHANKAR_NAIK

ZONE STEAM FLOW UNIT ADDED AND NOTE 1 UPDATED.

PROJECT:	1x660 MW BHUSAWAL TPS UNIT-6
OWNER:	MAHARASHTRA STATE POWER GENERATION CO. LTD.
CONSULTANT:	DEVELOPMENT CONSULTANTS PVT. LTD.
ENGINEER:	CONSULTING ENGINEERS
DESIGNER:	VASHI, NAVI MUMBAI
DRAWN BY:	BHARAT HEAVY ELECTRICALS LTD
CHECKED BY:	BOILER PLANT UNIT,
APPROVED BY:	TRUCHIRAPALLI-620014, INDIA.

DRG TITLE:	P&ID OF SCR SYSTEM - KEY DIAGRAM
QSCRM	
Babcock Power	
ENVIRONMENTAL	
ALL DIMENSIONS IN MILLIMETERS	
PROJECTION	SCALE
DRAWN BY : VIKAS_SETHI	DATE : 30.05.2019
CHECKED BY : SHANKAR_NAIK	DATE : 30.05.2019
APPROVED BY : SARAVANA_KUMAR	DATE : 30.05.2019
VETTED BY : BPE	DATE :
DRAWING NO.	0-SR-056-00049
REV.	03



SCR/DD/PG/001 REV00

DE-DUSTING SYSTEM /PERFORMANCE GUARANTEE

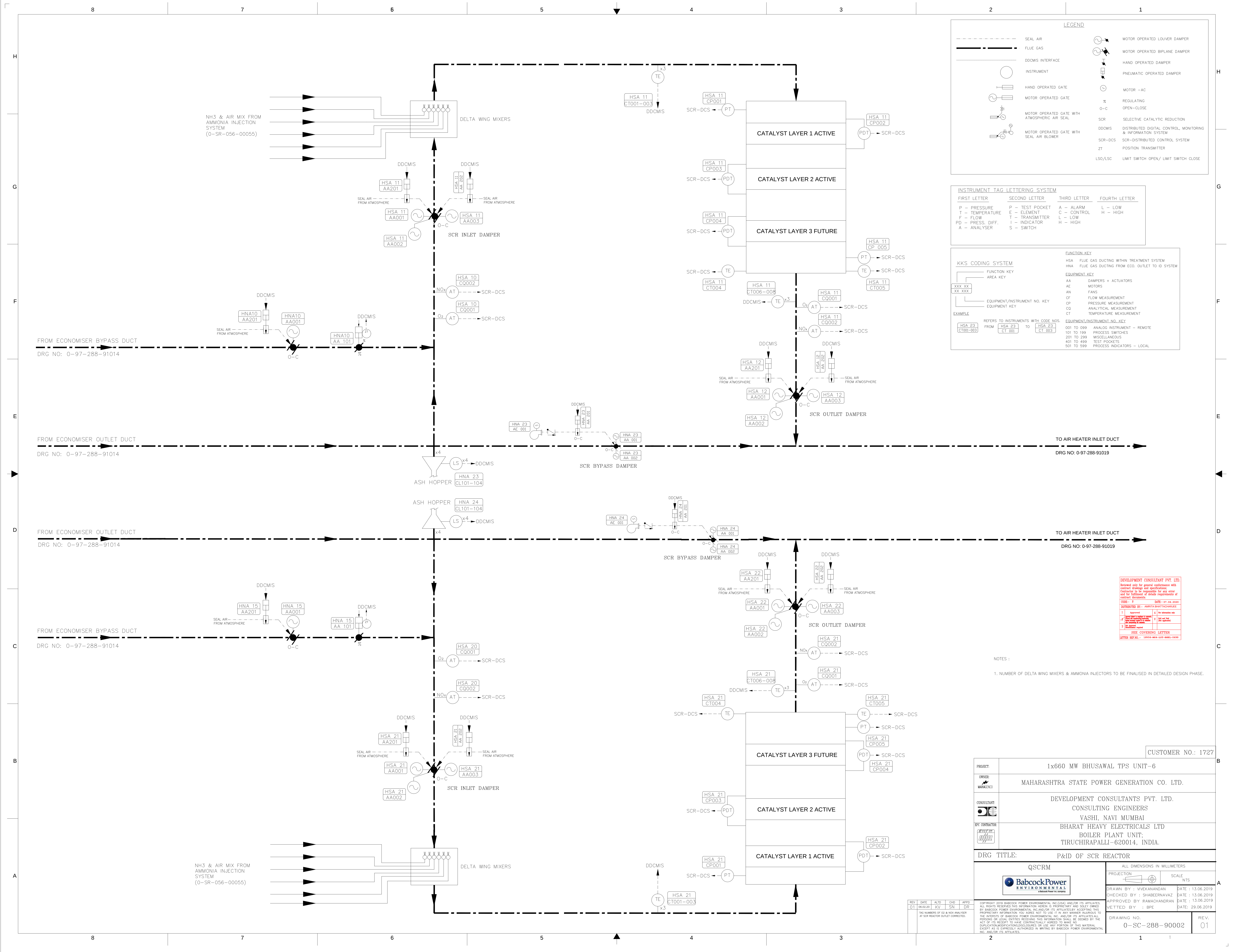
The vendor shall provide robust catalyst de-dusting system considering very high ash content of Indian coals. Vendor shall establish/ recommend de-dusting device frequency and their performance tuning based on the actual operation through controlled tests/measurements. Cleaning effectiveness shall target recovery, as measured through gas pressure drop and visual inspection, up to a near pressure drop value with reference to completely clean reactor as measured at the time of commissioning.

DE-DUSTING SYSTEM PERFORMANCE GUARANTEE DATA

Sl. No	DESCRIPTION	UNIT	PERFORMANCE GUARANTEE
1.	The operating Sonic horn's sound level within the reactor at any point	dBA	>125 dBA at all loads
2.	Exterior reactor noise level at 1 meter from the sonic horn/ash sweeper #	dBA	<85 dBA at all loads
3.	Catalyst surface cleaning requirement	-	Catalyst surface shall be free of ash accumulations that would harm or cause loss of catalyst performance.
4.	Boiler load condition for measurement of max pressure drop across reactor catalyst layers		TMCR Design Coal- Guarantee point
a.	Max pressure drop across the catalyst layer (from top of top catalyst to bottom to bottom catalyst layer)	mmwc	18.6
5.	Maximum service air consumption per unit (Service air pressure 7 kg/cm ² (g) at ambient temperature)	Nm ³ /hr	<430

- Sonic horn and Ash sweeper vendor to suggest a suitable insulation to achieve the above mentioned sound level.

Supplier's sign and seal



LEGEND

	SEAL AIR		MOTOR OPERATED LOUVER DAMPER
	FLUE GAS		MOTOR OPERATED BIPLANE DAMPER
	DDCMIS INTERFACE		HAND OPERATED DAMPER
	INSTRUMENT		PNEUMATIC OPERATED DAMPER
	HAND OPERATED GATE		MOTOR - AC
	MOTOR OPERATED GATE		REGULATING
	MOTOR OPERATED GATE WITH ATMOSPHERIC AIR SEAL		OPEN-CLOSE
	MOTOR OPERATED GATE WITH SEAL AIR BLOWER		SELECTIVE CATALYTIC REDUCTION
			DDCMIS DISTRIBUTED DIGITAL CONTROL, MONITORING & INFORMATION SYSTEM
			SCR-DISTRIBUTED CONTROL SYSTEM
			POSITION TRANSMITTER
			LIMIT SWITCH OPEN/ LIMIT SWITCH CLOSE

INSTRUMENT TAG LETTERING SYSTEM

FIRST LETTER	SECOND LETTER	THIRD LETTER	FOURTH LETTER
P - PRESSURE	P - TEST POCKET	A - ALARM	L - LOW
T - TEMPERATURE	E - ELEMENT	C - CONTROL	H - HIGH
F - FLOW	T - TRANSMITTER		
PD - PRESS. DIFF.	I - INDICATOR		
A - ANALYSER	S - SWITCH		

KK'S CODING SYSTEM

FUNCTION KEY: HSA FLUE GAS DUCTING WITHIN TREATMENT SYSTEM, HNA FLUE GAS DUCTING FROM ECO. OUTLET TO ID SYSTEM

AREA KEY: XXX XX, XX XXX

EQUIPMENT KEY: AA DAMPERS + ACTUATORS, AE MOTORS, AN FANS, CF FLOW MEASUREMENT, CP PRESSURE MEASUREMENT, CQ ANALYTICAL MEASUREMENT, CT TEMPERATURE MEASUREMENT

EQUIPMENT/INSTRUMENT NO. KEY: 001 TO 099 ANALOG INSTRUMENT - REMOTE, 101 TO 199 PROCESS SWITCHES, 201 TO 299 MISCELLANEOUS, 401 TO 499 TEST POCKETS, 501 TO 599 PROCESS INDICATORS - LOCAL

EXAMPLE: HSA 23 CT001-003 FROM HSA 23 CT 001 TO HSA 23 CT 003

DEVELOPMENT CONSULTANT PVT. LTD.
Borend said for general guidance with contract drawings and specifications. Developer shall be responsible for any error or omission in the drawings.

DESIGNED BY: AMRITA BHATTACHARYA

1	Approved	4	For circulation only
2	For circulation only	5	For circulation only
3	For circulation only	6	For circulation only

SUB COVERING LETTER

DRAWN BY: JALPA HADGADGAL

NOTES :

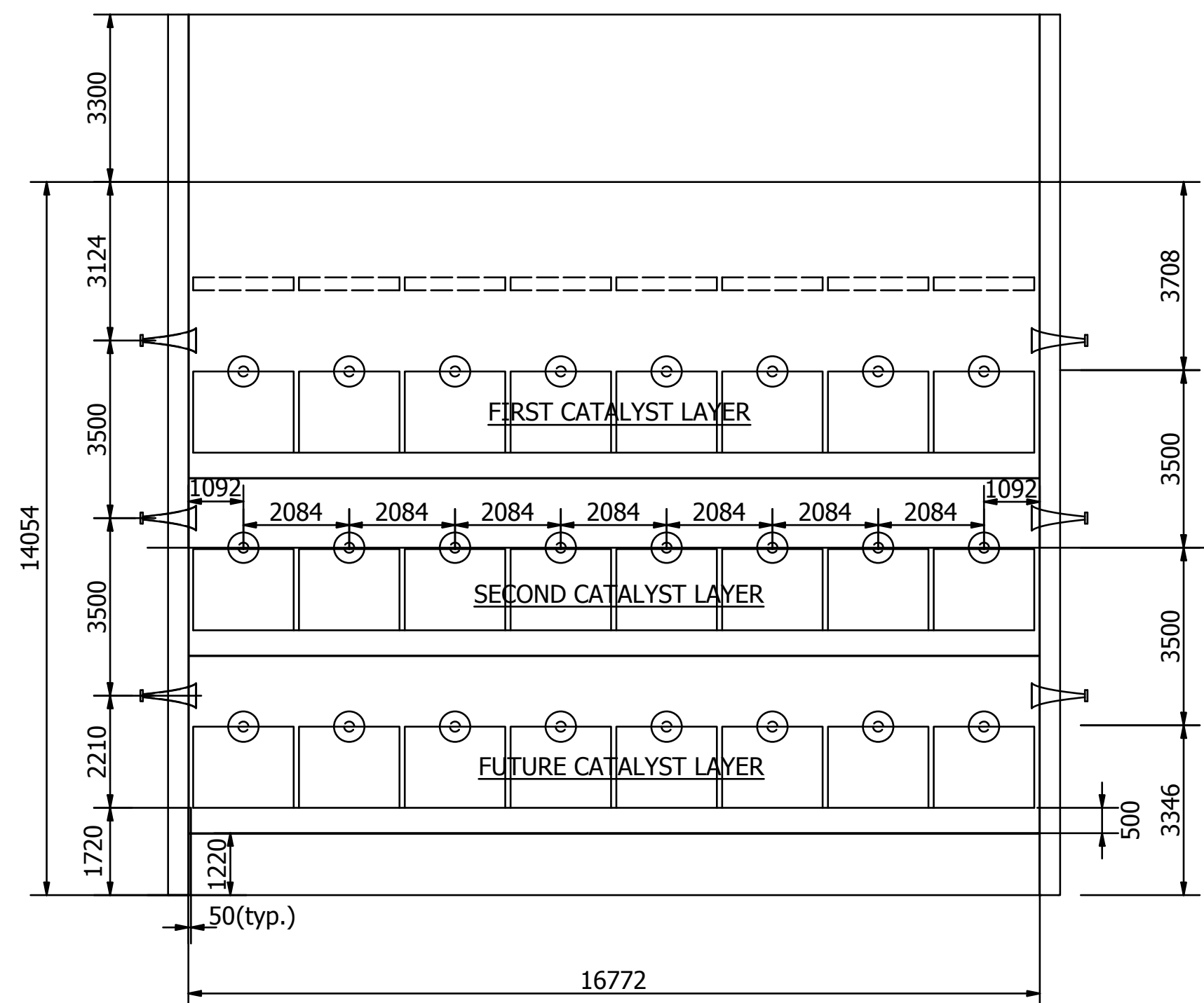
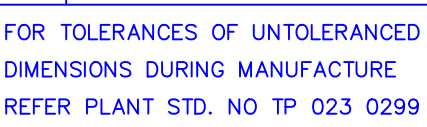
1. NUMBER OF DELTA WING MIXERS & AMMONIA INJECTORS TO BE FINALISED IN DETAILED DESIGN PHASE.

CUSTOMER NO.: 1727

PROJECT:	1x660 MW BHUSAWAL TPS UNIT-6
OWNER:	MAHARASHTRA STATE POWER GENERATION CO. LTD.
CONSULTANT:	DEVELOPMENT CONSULTANTS PVT. LTD. CONSULTING ENGINEERS VASHI, NAVI MUMBAI
DRG CONTRACTOR:	BHARAT HEAVY ELECTRICALS LTD BOILER PLANT UNIT, THRUCHIRAPALLI-620014, INDIA.
DRG TITLE: P&ID OF SCR REACTOR	
QSCRM	
ALL DIMENSIONS IN MILLIMETERS	
PROJECTION:	SCALE: NTS
DRAWN BY: VIVEKANANDAN	DATE: 13.06.2019
CHECKED BY: SHABEERNAVAZ	DATE: 13.06.2019
APPROVED BY: RAMACHANDRAN	DATE: 13.06.2019
VETTED BY: BPE	DATE: 29.06.2019
DRAWING NO:	REV:
0-SC-288-90002	01

REV	DATE	ALD	CHD	APFD
01	06.02.20	KV	SN	DR

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A 3D perspective schematic diagram of the Catalyst Loading Chamber (CLC). The diagram shows a rectangular chamber with a grid-like top surface labeled "RECTIFIER". An "ACCESS DOOR 600 X 600" is located on the right side. Inside the chamber, there are three horizontal rows of circular components labeled "ASH SWEEPER". The front-left vertical wall features several small, angled protrusions labeled "SONIC HORNS". An arrow at the bottom right indicates the "CATALYST LOADING DIRECTION" pointing towards the interior. A label "LOADING PLATFORM LOCATION #" points to the bottom-most row of ash sweepers.

[illegible]

NOTES:

1. NUMBER OF REACTORS PER BOILER: 2
2. NUMBER OF CATALYST MODULE PER LAYER: 96 (8W X 12D)
3. # CATALYST MODULE LOADING PLATFORM

☉ ASH SWEEPER, 32 NOS PER REACTOR, 64 NOS PER BOILER

☼ SONIC HORN, 16 NOS PER REACTOR, 32 NOS PER BOILER

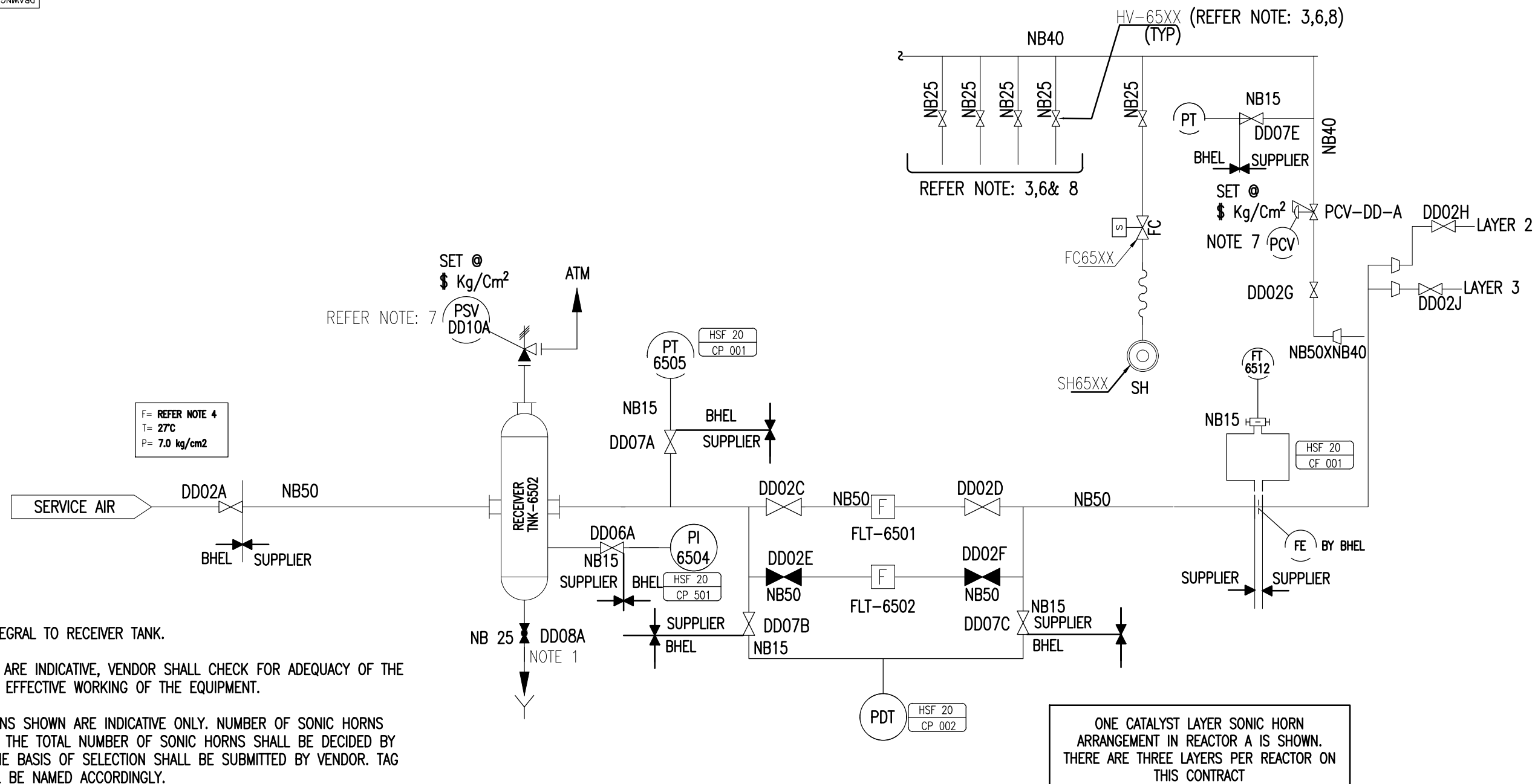
CAUTION: The information on this document is the property of BHARAT HEAVY ELECTRICALS and should not be used directly or indirectly in any way detrimental to the interest of the company.	TYPE OF PRODUCT: MAHARASHTRA STATE POWER GENERATION CO.LTD. OR NAME CUSTOMER/PROJECT 1 X 660 MW TPS BHUSAWAL UNIT - 6																						
				Bharat Heavy Electricals Ltd UNIT: HIGH PRESSURE BOILER PLANT TIRUCHIRAPALLI - 620014				<table><tr><td>DRN</td><td>NAME</td><td>SIGNATURE</td><td>DATE</td></tr><tr><td>CHD</td><td>SRINIVASA ARUGULA</td><td></td><td>03.06.2019</td></tr><tr><td>APPD</td><td>SARAVAN KUMAR G</td><td></td><td>03.06.2019</td></tr></table>		DRN	NAME	SIGNATURE	DATE	CHD	SRINIVASA ARUGULA		03.06.2019	APPD	SARAVAN KUMAR G		03.06.2019		
	DRN	NAME	SIGNATURE	DATE																			
	CHD	SRINIVASA ARUGULA		03.06.2019																			
	APPD	SARAVAN KUMAR G		03.06.2019																			
355-053			PROJECTION		SCALE		WEIGHT (Kg)		REF TO ASSY / OLD DWG														
DEPT FS CODE 129		ALL DIMENSIONS ARE IN MM				NTS		---															
TITLE								DRAWING NO : 1-SR-000-00005		REV 01													

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- NOTES:
1. THERMAL SAFETY SHIELD.
 2. VENDOR TO ADEQUATELY SIZE THE PRESSURE RELIEF VALVE WITH APPLICABLE STANDARDS AND MENTION THE SIZE IN THE OFFER. (\$)—PRESSURE RELIEF VALVE INTEGRAL TO ASH SWEEPER BODY. VENDOR SHALL SPECIFY THE SET PRESSURE.
 3. ALL PIPE SIZES ARE PRELIMINARY, VENDOR SHALL CHECK AND CONFIRM THE LINE SIZES FOR EFFECTIVE WORKING OF THE EQUIPMENT.
 4. THE ASH SWEEPERS SHOWN ARE INDICATIVE ONLY. NUMBER OF ASH SWEEPERS PER LAYER AND THE TOTAL NO OF ASH SWEEPERS SHALL BE DECIDED BY VENDOR AND THE BASIS OF SELECTION SHALL BE SUBMITTED BY VENDOR.
 5. FLEX HOSE FROM SOLENOID VALVE TO ASH SWEEPER ASSEMBLY; NO HARD PIPE.
 6. TOTAL FLOW REQUIRED SHALL BE SPECIFIED BY VENDOR.
 7. TAG NUMBERS SHOWN FOR REACTOR A WITH PREFIX "67"YY; WHEREAS FOR REACTOR B PREFIX "68" YY SHALL BE USED.
 8. DEPENDING ON THE FINAL QUANTITY OF ASH SWEEPERS, THE "YY" "ZZ" IN TAG NUMBERS TO BE SUITABLY NUMBERED BY VENDOR AS 01,02 ETC.
 9. ALL EQUIPMENT, PIPING, INSTRUMENTS AND THEIR ROOT VALVES TO BE SUPPLIED BY VENDOR AS PER MARKED SCOPE.
 10. PIPING MATERIAL SHALL BE STAINLESS STEEL AS PER ASTM A312 Gr 304.

CAUTION: The information on this drawing is the property of BHARAT HEAVY ELECTRICALS LTD. It must not be used directly or indirectly in any way detrimental to the interest of the company.	TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT		BHUSAWAL THERMAL POWER STATION				ORDER No. : 1727
			UNIT 6 (1X660 MW)				
	 355-055	Bharat Heavy Electricals Ltd UNIT: HIGH PRESSURE BOILER PLANT TRUCHIRAPALLI – 620014		DRN	NAME BALAJI D	SIGNATURE —sd—	DATE 02/07/2020
				CHD	PREETAM KUMAR	—sd—	02/07/2020
				APPD	SHANKAR NAIK	—sd—	02/07/2020
DEPT FS CODE 129		ALL DIMENSIONS ARE IN MM		SCALE —	WEIGHT (Kg) NA	REF TO ASSY / OLD DWG NA	
TITLE P&ID FOR ASH SWEEPER SYSTEM					DRAWING NO : 3—SR—500—00006		REV 01



NOTES:

- AUTO DRAIN INTEGRAL TO RECEIVER TANK.
- ALL PIPE SIZES ARE INDICATIVE, VENDOR SHALL CHECK FOR ADEQUACY OF THE LINE SIZES FOR EFFECTIVE WORKING OF THE EQUIPMENT.
- THE SONIC HORNS SHOWN ARE INDICATIVE ONLY. NUMBER OF SONIC HORNS PER LAYER AND THE TOTAL NUMBER OF SONIC HORNS SHALL BE DECIDED BY VENDOR AND THE BASIS OF SELECTION SHALL BE SUBMITTED BY VENDOR. TAG NUMBERS SHALL BE NAMED ACCORDINGLY.
- TOTAL AIR FLOW REQUIRED FOR DE-DUSTING SHALL BE FURNISHED BY VENDOR.
- ALL EQUIPMENT, PIPING, INSTRUMENTS AND THEIR ROOT VALVES TO BE SUPPLIED BY VENDOR AS PER MARKED SCOPE.
- TAG NUMBERS SHOWN ARE FOR REACTOR A WITH PREFIX "65"XX; WHEREAS FOR REACTOR B PREFIX "66" XX SHALL BE USED.
- VENDOR TO ADEQUATELY SIZE THE PRESSURE RELIEF VALVE WITH APPLICABLE STANDARDS AND MENTION THE SIZE IN THE OFFER.
(\$) - PRESSURE RELIEF VALVE INTEGRAL TO ASH SWEEPER BODY. VENDOR SHALL SPECIFY THE SET PRESSURE .
- DEPENDING ON THE FINAL QUANTITY OF SONIC HORNS, THE "XX" IN TAG NUMBERS TO BE SUITABLY NUMBERED BY VENDOR AS 19,20,21., ETC.
- FLEX HOSE FROM SOLENOID VALVE TO ASH SWEEPER ASSEMBLY; NO HARD PIPE.
- AIR PIPING MATERIAL SHALL BE STAINLESS STEEL AS PER ASTM 312 Gr304.

REV	DATE	ALTERED : BALAJI D
01	02.08.2021	CHD & APPD:
ZONE	NOTE 10 ADDED.	

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			UNIT 6 (1X660 MW)					
	 355-055		Bharat Heavy Electricals Ltd UNIT: HIGH PRESSURE BOILER PLANT TIRUCHIRAPALLI - 620014		DRN	NAME BALAJI D	SIGNATURE —sd—	DATE 30/12/2020
					CHD	PREETAM KUMAR	—sd—	30/12/2020
					APPD	SHANKAR NAIK	—sd—	30/12/2020
	DEPT FS	ALL DIMENSIONS ARE IN MM		SCALE —	WEIGHT (Kg) NA	REF TO ASSY / OLD DWG NA		
	CODE 129							
	TITLE					DRAWING NO :		REV
	P&ID FOR SONIC HORN SYSTEM					3—SR—500—00005		01



VALVE SCHEDULE FOR SCR DE-DUSTING SYSTEM

MAHARASTRA STATE POWER GENERATION COMPANY LIMITED

BHUSAWAL THERMAL POWER STATION :: 1 X 660 MW

CUSTOMER NO: 1727

REFERENCE P&ID NUMBERS : 0-SR-056-00049, 3-SR-500-00005 & 3-SR-500-00006

DOCUMENT NO: SR/DD/1727/VALVE/001

	NAME	SIGNATURE	DATE	DOCUMENT NO:	REV:00
PREPARED	BALAJI D	-sd-	1/14/2021	SR/AFS/1727/VALVE/001	
CHECKED	PREETAM KUMAR S	-sd-	1/14/2021		
APPROVED	SHANKAR NAIK V	-sd-	1/14/2021	SHEET: 01 OF 05	

**SCHEDULE OF VALVES AND FITTINGS- SR/DD/1727/VALVE/001****CUSTOMER: M/S MAHAGENCO****PROJECT: BHUSAWAL TPS UNIT 6, (1X660MW), Cust. No 1727****REFERENCE SCHEME DWG NO:****3-SR-000-00005 &****3-SR-000-00006****PGMA: SR500 - CATALYST DE DUSTING SYSTEM -REACTOR A & B**

Sl.no	TAG NO	SERVICE DESCRIPTION	VALVE TYPE	SIZE/NB /INCH	Oper	MAX.WORK PRESS Temp		BOD Y MAT	BODY RATIN G	END CONN	MAKE	QTY PER BLR	Remarks
						PR	Temp						
1	DD02A	ISOL FOR RECIEVER TANK	GATE	50	HAND	7	27	CS	C800	SW	BHEL	1	
2	DD10A	PRESSURE RELIEF VALVE	ANGLE RELIEF	*	SELF	7	27	CS	C800	FLANGED	supplier	1	* supplier to fill
3	DD08A	RECEIVER TANK DRAIN ISOL	GLOBE	25	HAND	7	27	CS	C800	SW	supplier	1	
4	DD06A	PI INST ISOL	GATE	15	HAND	7	27	CS	C800	SW	supplier	1	
5	DD07A	PT INST ISOL	GATE	15	HAND	7	27	CS	C800	SW	supplier	1	
6	DD02C	FILTER ISOL IN	GATE	50	HAND	7	27	CS	C800	SW	supplier	1	
7	DD02D	FILTER ISOL OUT	GATE	50	HAND	7	27	CS	C800	SW	supplier	1	
8	DD02E	FILTER ISOL IN	GATE	50	HAND	7	27	CS	C800	SW	supplier	1	
9	DD02F	FILTER ISOL OUT	GATE	50	HAND	7	27	CS	C800	SW	supplier	1	
10	DD07B	PDT ISOL VALVE IN	GATE	50	HAND	7	27	CS	C800	SW	supplier	1	
11	DD07C	PDT ISOL VALVE OUT	GATE	50	HAND	7	27	CS	C800	SW	supplier	1	
12	DD02G	SONIC HORN REACTOR-A LAYER 1 ISOL	GATE	40	HAND	7	27	CS	C800	SW	supplier	1	
13	DD-A	SELF REGULATING VALVE REACTOR-A LAYER 1	REG	40	SELF	7	27	CS	C300	FLANGED	supplier	1	
14	DD02H	SONIC HORN REACTOR-A LAYER 2 ISOL	GATE	40	HAND	7	27	CS	C800	SW	supplier	1	
15	DD-B	SELF REGULATING VALVE REACTOR-A LAYER 2	REG	40	SELF	7	27	CS	C300	FLANGED	supplier	1	
16	DD02J	SONIC HORN REACTOR-A LAYER 3 ISOL	GATE	40	HAND	7	27	CS	C800	SW	supplier	1	
17	DD-C	SELF REGULATING VALVE REACTOR-A LAYER 3	REG	40	SELF	7	27	CS	C300	FLANGED	supplier	1	
18	DD07E	PT INST ISOL	GATE	15	HAND	7	27	CS	C800	SW	supplier	1	
19	DD07F	PT INST ISOL	GATE	15	HAND	7	27	CS	C800	SW	supplier	1	
20	DD07G	PT INST ISOL	GATE	15	HAND	7	27	CS	C800	SW	supplier	1	
21	DD02B	ASH SWEEPER ISOL	GATE	40	HAND	7	27	CS	C800	SW	supplier	1	
22	DD07D	PT INST ISOL	GATE	15	HAND	7	27	CS	C800	SW	supplier	1	
23	DD08B	PIPE LINE DRAIN ISOL- RACTOR A	GLOBE	20	HAND	7	27	CS	C800	SW	supplier	1	
24	DD02K	ASH SWEEPER REACTOR- A- LAYER 1 ISOL	GATE	40	HAND	7	27	CS	C800	SW	supplier	1	
25	DD02L	ASH SWEEPER REACTOR-A- LAYER 2 ISOL	GATE	40	HAND	7	27	CS	C800	SW	supplier	1	

**SCHEDULE OF VALVES AND FITTINGS- SR/DD/1727/VALVE/001****CUSTOMER: M/S MAHAGENCO****PROJECT: BHUSAWAL TPS UNIT 6, (1X660MW), Cust. No 1727****REFERENCE SCHEME DWG NO:
3-SR-000-00005 &
3-SR-000-00006****PGMA: SR500 - CATALYST DE DUSTING SYSTEM -REACTOR A & B**

	TAG NO	SERVICE DESCRIPTION	VALVE TYPE	SIZE/NB /INCH	Oper	MAX.WORK PRESS Temp		BOD Y MAT	BODY RATIN G	END CONN	MAKE	QTY PER BLR	Remarks
26	DD02M	ASH SWEEPER REACTOR-A- LAYER 3 ISOL	GATE	40	HAND	7	27	CS	C800	SW	supplier	1	
27	DD02A1	ISOL FOR RECIEVER TANK	GATE	50	HAND	7	27	CS	C800	SW	BHEL	1	
28	DD10A1	PRESSURE RELIEF VALVE	ANGLE RELIEF	*	SELF	7	27	CS	C800	FLANGED	supplier	1	* supplier to fill
29	DD08A1	RECEIVER TANK DRAIN ISOL	GLOBE	25	HAND	7	27	CS	C800	SW	supplier	1	
30	DD06A1	PI INST ISOL	GATE	15	HAND	7	27	CS	C800	SW	supplier	1	
31	DD07A1	PT INST ISOL	GATE	15	HAND	7	27	CS	C800	SW	supplier	1	
32	DD02C1	FILTER ISOL IN	GATE	50	HAND	7	27	CS	C800	SW	supplier	1	
33	DD02D1	FILTER ISOL OUT	GATE	50	HAND	7	27	CS	C800	SW	supplier	1	
34	DD02E1	FILTER ISOL IN	GATE	50	HAND	7	27	CS	C800	SW	supplier	1	
35	DD02F1	FILTER ISOL OUT	GATE	50	HAND	7	27	CS	C800	SW	supplier	1	
36	DD07B1	PDT ISOL VALVE IN	GATE	50	HAND	7	27	CS	C800	SW	supplier	1	
37	DD07C1	PDT ISOL VALVE OUT	GATE	50	HAND	7	27	CS	C800	SW	supplier	1	
38	DD02G1	SONIC HORN REACTOR-B LAYER 1 ISOL	GATE	40	HAND	7	27	CS	C800	SW	supplier	1	
39	DD-A1	SELF REGULATING VALVE REACTOR-B LAYER 1	REG	40	SELF	7	27	CS	C300	FLANGED	supplier	1	
40	DD02H1	SONIC HORN REACTOR-B LAYER 2 ISOL	GATE	40	HAND	7	27	CS	C800	SW	supplier	1	
41	DD-B1	SELF REGULATING VALVE REACTOR-B LAYER 2	REG	40	SELF	7	27	CS	C300	FLANGED	supplier	1	
42	DD02J1	SONIC HORN REACTOR-B LAYER 3 ISOL	GATE	40	HAND	7	27	CS	C800	SW	supplier	1	
43	DD-C1	SELF REGULATING VALVE REACTOR-B LAYER 3	REG	40	SELF	7	27	CS	C300	FLANGED	supplier	1	
44	DD07E1	PT INST ISOL	GATE	15	HAND	7	27	CS	C800	SW	supplier	1	
45	DD07F1	PT INST ISOL	GATE	15	HAND	7	27	CS	C800	SW	supplier	1	
46	DD07G1	PT INST ISOL	GATE	15	HAND	7	27	CS	C800	SW	supplier	1	
47	DD02B1	ASH SWEEPER ISOL REACTOR B	GATE	40	HAND	7	27	CS	C800	SW	supplier	1	
48	DD07D1	PT INST ISOL	GATE	15	HAND	7	27	CS	C800	SW	supplier	1	
49	DD08B1	PIPE LINE DRAIN ISOL- RACTOR B	GLOBE	20	HAND	7	27	CS	C800	SW	supplier	1	
50	DD02K1	ASH SWEEPER REACTOR-B-LAYER 1 ISOL	GATE	40	HAND	7	27	CS	C800	SW	supplier	1	

**SCHEDULE OF VALVES AND FITTINGS- SR/DD/1727/VALVE/001****CUSTOMER: M/S MAHAGENCO****PROJECT: BHUSAWAL TPS UNIT 6, (1X660MW), Cust. No 1727****REFERENCE SCHEME DWG NO:
3-SR-000-00005 &
3-SR-000-00006****PGMA: SR500 - CATALYST DE DUSTING SYSTEM -REACTOR A & B**

	TAG NO	SERVICE DESCRIPTION	VALVE TYPE	SIZE/NB /INCH	Oper	MAX.WORK PRESS Temp		BOD Y MAT	BODY RATIN G	END CONN	MAKE	QTY PER BLR	Remarks
51	DD02L1	ASH SWEEPER REACTOR-B-LAYER 2 ISOL	GATE	40	HAND	7	27	CS	C800	SW	supplier	1	
52	DD02M1	ASH SWEEPER REACTOR-B-LAYER 3 ISOL	GATE	40	HAND	7	27	CS	C800	SW	supplier	1	
53	FC65XX	ON/OFF VALVE INDIVIDUAL SH	*	*	PNEU	7	27	CS	*	*	supplier	*	* supplier to fill
54	HV65XX	ISOL VALVE TO INDIVIDUAL SH	GATE	25	HAND	7	27	CS	C800	SW	supplier	*	* supplier to fill
55	HV67YY	ISOL VAL TO INDIVIDUAL ASW	GATE	15	HAND	7	27	CS	C800	SW	supplier	*	* supplier to fill
56	HV67ZZ	ISOL VAL TO INDIVIDUAL PI TO ASW	GATE	15	HAND	7	27	CS	C800	SW	supplier	*	* supplier to fill
57	PSV67YY	PRESSURE SAFETY VALVE	ANGLE RELIEF	*	SELF	7	27	CS	C800	FLANGED	supplier	*	* supplier to fill
58	AS67YY	ON/OFF VALVE INDIVIDUAL ASW	*	*	PNEU	7	27	CS	*	*	supplier	*	* supplier to fill
59	FC66XX	ON/OFF VALVE INDIVIDUAL SH	*	*	PNEU	7	27	CS	*	*	supplier	*	* supplier to fill
60	HV66XX	ISOL VALVE TO INDIVIDUAL SH	GATE	25	HAND	7	27	CS	C800	SW	supplier	*	* supplier to fill
61	HV68YY	ISOL VAL TO INDIVIDUAL ASW	GATE	15	HAND	7	27	CS	C800	SW	supplier	*	* supplier to fill
62	HV68ZZ	ISOL VAL TO INDIVIDUAL PI TO ASW	GATE	15	HAND	7	27	CS	C800	SW	supplier	*	* supplier to fill
63	PSV68YY	PRESSURE SAFETY VALVE	ANGLE RELIEF	*	SELF	7	27	CS	C800	FLANGED	supplier	*	* supplier to fill
64	AS68YY	ON/OFF VALVE INDIVIDUAL ASW	*	*	PNEU	7	27	CS	*	*	supplier	*	* supplier to fill

NOTE: VALVE SCHEDULE FURNISHED IS FOR LAYER1 OF REACTOR A & B, SUPPLIER TO FURNISH THE VALVE SCHEDULE FOR FOR OFFERED LAYERS.

1802100149 dated 13.08.2021 'PRICE AND UNPRICE BID SCHEDULE FOR IMPORT SUPPLIERS SUPPLY OF SCR DEDUSTING SYSTEM FOR BHUSAWAL PROJECT												
Enquiry Sl. No	Material Code	Items Details / Description	Qty	Unit	Net Weight	Gross weight	size	Unit Rate	Total Material Cost	Packing & Forwarding charges	Sea Freight Charge	Total Value (CFR)
					Kgs	Kgs	L x B x H	Currency -Type	Currency -Type	Currency-Type	Currency -Type	Currency -Type
10	L17271SR50001005	SCR DEDUSTING SYSTEM	1	SET								
		Lumpsum charges for Supervision of erection and commissioning of the complete system as per clause 6 (d) of Annexure-A.	1	Unit								
		Optional price for 5-year operating spare parts. (Item list to be submitted along with technical bid)	1	SET								
		TOTLA PRICE - FOB / Nearest Sea Port										
		TOTAL SEA FREIGHT CHAGES										
		TOTAL PRICE - CFR / CHENNAI PORT										

1802100149 dated 25.05.2021

'PRICE AND UNPRICE BID SCHEDULE FOR INDIGENOUS SUPPLIERS

SUPPLY OF SCR DEDUSTING SYSTEM FOR BHUSAWAL PROJECT

Enquiry Sl. No	Material Code	Items Details	Qty	Unit	Unit Rate	Total Material Cost	Packing and Forwarding Charges	Freight Charges	GST	Total Value (FOR)
					Rs.	Rs.	Rs.	Rs.	%	Rs.
10	L17271SR50001005	SCR DEDUSTING SYSTEM	2	SET						
		Lumpsum charges for Supervision of erection and commissioning of the complete system as per clause 6 (d) of Annexure-A.	1	Unit						
		Optional price for 5-year operating spare parts. (Item list to be submitted along with technical bid)	1	SET						

BANK GUARANTEE FOR PERFORMANCE SECURITY

(Non-Judicial Stamp paper/e-stamp paper of appropriate value as per Stamp Act prevailing in the State(s))

Bank Guarantee No:

Date:

To

NAME

& ADDRESSES OF THE BENEFICIARY

IFSC AND MICR CODE

Dear Sirs,

1. In consideration of Bharat Heavy Electricals Limited (hereinafter referred to as the 'Employer' which expression shall unless repugnant to the context or meaning thereof, include its successors and permitted assigns) incorporated under the Companies Act, 1956 and having its registered office at _____¹ through its Unit at.....(name of the Unit) having awarded to (Name of the Vendor / Contractor / Supplier) (VENDOR CODE) with its registered office at _____² hereinafter referred to as the ' Vendor / Contractor / Supplier ', which expression shall unless repugnant to the context or meaning thereof, include its successors and permitted assigns), a contract Ref No.....dated³ valued at Rs.....⁴ (Rupees -----)/FC.....(in words.....) for⁵ (hereinafter called the 'Contract') and the Vendor / Contractor / Supplier having agreed to provide a Contract Performance Bank Guarantee, equivalent to% (... Percent) of the said value of the Contract to the Employer for the faithful performance of the Contract,

2. we,, (hereinafter referred to as the Bank), having registered/Head office at and inter alia a branch at being the Guarantor under this Guarantee, hereby, irrevocably and unconditionally undertake to forthwith and immediately pay to the Employer any sum or sums upto a maximum amount of Rs -----⁶ (Rupees -----) without any demur, immediately on first demand from the Employer and without any reservation, protest, and recourse and without the Employer needing to prove or demonstrate reasons for its such demand.

3. Any such demand made on the Bank shall be conclusive as regards the amount due and payable by the Bank under this guarantee. However, our liability under this guarantee shall be restricted to an amount not exceeding Rs. _____.

4. We undertake to pay to the Employer any money so demanded notwithstanding any dispute or disputes raised by the Vendor / Contractor / Supplier in any suit or proceeding pending before any Court or Tribunal, Arbitrator or any other authority, our liability under this present being absolute and unequivocal.

5. The payment so made by us under this Guarantee shall be a valid discharge of our liability for payment thereunder and the Vendor / Contractor / Supplier shall have no claim against us for making such payment.

6. We thebank further agree that the guarantee herein contained shall remain in full force and effect during the period that would be taken for the performance of the said Contract/satisfactory completion of the performance guarantee period as per the terms of the Contract and that it shall continue to be enforceable till all the dues of the Employer under or by virtue of the said Contract have been fully paid and its claims satisfied or discharged.

7. We.....BANK further agree with the Employer that the Employer shall have the fullest liberty without our consent and without affecting in any manner our obligations hereunder to vary any of the terms and conditions of the said Contract or to extend time of performance by the said Vendor / Contractor / Supplier from time to time or to postpone for any time or from time to time any of the powers exercisable by the Employer against the said Vendor / Contractor / Supplier and to forbear or enforce any of the terms and conditions relating to the said Contract and we shall not be relieved from our liability by reason of any such variation, or extension being granted to the said Vendor / Contractor / Supplier or for any forbearance, act or omission on the part of the Employer or any indulgence by the Employer to the said Vendor / Contractor / Supplier or by any such matter or thing whatsoever which under the law relating to sureties would but for this provision have effect of so relieving us.

8. The Bank also agrees that the Employer at its option shall be entitled to enforce this Guarantee against the Bank as a principal debtor, in the first instance without proceeding against the Vendor / Contractor / Supplier and notwithstanding any security or other guarantee that the Employer may have in relation to the Vendor / Contractor / Supplier's liabilities.

9. This Guarantee shall remain in force upto and including.....⁷ and shall be extended from time to time for such period as may be desired by Employer.

10. This Guarantee shall not be determined or affected by liquidation or winding up, dissolution or change of constitution or insolvency of the Vendor / Contractor / Supplier but shall in all respects and for all purposes be binding and operative until payment of all money payable to the Employer in terms thereof.

11. Unless a demand or claim under this guarantee is made on us in writing on or before the⁸we shall be discharged from all liabilities under this guarantee thereafter.

12. Any claim or dispute arising under the terms of this document shall only be enforced or settled in the Courts at Tiruchirappalli.

13. We..... BANK lastly undertake not to revoke this guarantee during its currency except with the previous consent of the Employer in writing.

Notwithstanding anything to the contrary contained hereinabove:

a) The liability of the Bank under this Guarantee shall not exceed.....⁶

- b) This Guarantee shall be valid up to⁷
- c) Unless the Bank is served a written claim or demand on or before (minimum 3 to 6 months from the expiry date)⁸ all rights under this guarantee shall be forfeited and the Bank shall be relieved and discharged from all liabilities under this guarantee irrespective of whether or not the original bank guarantee is returned to the Bank.

14. We, _____ Bank, have power to issue this Guarantee under law and the undersigned as a duly authorized person has full powers to sign this Guarantee on behalf of the Bank.

For and on behalf of
(Name of the Bank)

Dated.....

Place of Issue.....

BANK EMAIL ID:

BANK PHONE NO:

AUTHORISED SIGNATORIES CELL PHONE NO:

BANK FAX NO:

¹ NAME AND ADDRESS OF EMPLOYER I.e Bharat Heavy Electricals Limited

² NAME AND ADDRESS OF THE VENDOR /CONTRACTOR / SUPPLIER.

³ DETAILS ABOUT THE NOTICE OF AWARD/CONTRACT REFERENCE

⁴ CONTRACT VALUE

⁵ PROJECT/SUPPLY DETAILS

⁶ BG AMOUNT IN FIGURES AND WORDS

⁷ VALIDITY DATE

⁸ DATE OF EXPIRY OF CLAIM PERIOD

Sl.	Name of the bank	
1	State Bank of India	
2	Canara Bank	
3	Axis Bank	
4	Bank of Baroda	
5	Central Bank	
6	Citi Bank N.A.	
7	Deutsche Bank **	
8	Exim Bank	
9	Federal Bank Limited	
10	HDFC Bank Limited	
11	Hongkong and Shanghai Banking Corporation Ltd	
12	Indian Bank	
13	ICICI Bank Limited	
14	IDBI Bank Limited	
15	IndusInd Bank Limited	
16	Indian Overseas Bank	
17	Kotak Mahindra Bank Limited	
18	Punjab National Bank	
19	RBL Bank Ltd.	
20	Standard Chartered Bank	
21	Union Bank of India	
22	Yes Bank Limited	
	TOTAL	

/ On Bidder's office letter pad /

Self-Declaration

Enquiry No.	1802100149
Enquiry Date	13.08.2021

In line with Government public procurement order Number P-45021/2/2017-B.E-II dated 15.06.2017, and further modified order dt. 28.05.2018 and 04.06.2020.

I / We hereby declare that I / We are a “Local Supplier” meeting the requirement of minimum local content (....%) defined in the above government notification for the goods against above mentioned enquiry Number.

Details of location at which local value addition will be made is as follows:

Door No.	
Street / Address 1	
Street / Address 2	
District	
State	
Country	
PIN Code	

We also understand that the false declarations will be considered as breach of Integrity and liable for action.

For Company Name:

Seal:

Signature:

Date:

Place:

(Please fill all the yellow color field)