

Ref. Enquiry No.: PE/PG/RTC/E-5605/2017

Dated: 09/05/2017

TENDER ENQUIRY THROUGH E-PROCUREMENT

DUE DATE
23/05/2017
BY 1400 HRS

SUBJECT: TENDER ENQUIRY FOR RATE CONTRACT OF SELF CLEANING STRAINERS AS PER TECHNICAL SPECIFICATION NO. PE-TS-RC-165-N004 Rev00

OUR REF: TENDER ENQUIRY NO: PE/PG/RTC/E-5605/2017, DTD-09/05/2017

Dear Sir/ Ma'am,

We are pleased to invite your offer for subject package in two parts strictly as per Clause-2.0 of the enclosed "Instructions to Bidders" of the General Conditions of Contract (GCC) Rev-06 available at following link:- <http://www.bhelpem.com/Documents/GCC/GCC-Rev-06.pdf>. Please upload your best quotation/ offer on <https://bheleps.buyjunction.in> for the requirement strictly as per schedule of price format before above mentioned due date & time. The details of the tender enquiry are as mentioned below:

Sl. No	Description for which Rate Contract is desired	Tentative Quantity	Delivery required
1	<u>SELF CLEANING STRAINERS</u> - Refer Technical specification no PE-TS-RC-165-N004 for detailed description.	As per BOQ cum price schedule (in Annexure-I) cumulative for the Prospective Projects (Annexure-III)	Supply: - "Six (06) months from drgs. /docs. approval in CAT-I issued by BHEL. Successful bidder to make 1st submission of drawing/docs as per terms and conditions specified in Cl. No. 1 of the "Specific Technical Requirements" of "Technical Specification for Rate Contract of Self Cleaning Strainers (SCS) Doc. No. PE-TS-RC-165-N004 Rev00". Any deficiency in documents submitted w.r.t. agreed specification/ comments from BHEL shall be treated as non-submission and no. of days' delay in submission of complete documents during approval process, on account of this, would be reduced from the delivery. The vendor shall be responsible for getting approval from BHEL as early as possible and BHEL will support the process, in full, within above time frame and terms & conditions." Installation Checks & PG Test: - Vendor shall depute their personnel within 15 days of intimation of BHEL.

Your best quotation/offer for the above requirement, in line with our terms and conditions, should be submitted online via e-procurement system. It shall be the responsibility of the bidder to ensure that the Tender is submitted

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on or before the due date by 2 p.m. Part-I bids shall be opened at 3 p.m. on the due date in the presence of authorized representatives of the bidders, who may like to be present.

Note: -

- 1. Documents and Credential as per Technical PQR, Techno Commercial Bids and Price Bids should be uploaded on the e-procurement portal.**
- 2. Evaluation will be done on overall L1 (Total cost to BHEL) basis with necessary loading as applicable. Incomplete offer or offer for part of NIT BOM/BOQ shall be summarily rejected.**

Please refer GCC Rev-06 which is available on www.bhhelpem.com. You are requested to kindly download the same.

- 1. Rate contract on firm price basis is proposed for 2 years from placement of Rate Contract PO with a provision for further extension after review on mutual consent.**

Rate Contract is proposed to be done with 2 vendors in ratio of 60: 40, value wise at L1 FOR site price for subject package (% of splitting of RC between 2 vendors may be changed during ordering process, if L1 bidder is not customer approved); however, order for a project (only for the BOQ required as per specific project requirement) shall not be split and will be placed on single vendor.

Evaluation will be done on overall L1 (Total cost to BHEL) basis with necessary loading as applicable.

- 2. Prices shall be firm.**
- 3. Bidders to note the following: -**
 - a) Rate contract shall be decided on the basis of grand Total FOR site price of Total BOQ as listed in price format (Annexure-I)**
 - b) Though evaluation is proposed on Grand Total FOR site, but there is % allocation weightage against BOQ quantity of each item which shall be used for arriving at price break up. Bidders need to give only their Ex Works price for given BOQ at Column No. 5 Row No. 13 (Mentioned as A) of Annexure I.**
 - c) Bidders also require to mention % of taxes/ duties (against respective column for ED, CST & Service Tax) applicable for each item.**
 - d) All the columns to be filled by supplier have been highlighted in yellow. Bidders do not need to write anything on the remaining columns. The bidders need to mention the word "QUOTED" in the unpriced format wherever the words "To be quoted" have been mentioned in the highlighted section of the price format. Further, in the Price format, bidders need to mention their Ex-Works price (total) and percentage of ED, CST and Service Tax as applicable.**
 - e) Bidder to give % of freight charges considering anywhere in India in the freight column.**
 - f) Rest of the prices shall be derived by BHEL in line with % allocation fixed for each item.**
 - g) It is to be noted that other columns it will be noted as "derived" which denotes shall be derived by BHEL as per % allocation fixed against each item.**

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- L1 rates shall be counter offered to vendors (L2, L3 & so on) in succession. If none accepts L1 rates, RC shall be done with L1 vendor for 100 % value. Vendors shall be asked to quote prices with CST against form C and same state ordering shall not be done to save VAT.
- Vendor shall be informed that evaluation shall be done on CST basis, however in case, the entire business volume goes to one vendor (or volume of business shared between the vendors in line with enquiry) having manufacturing facility in the same state, then BHEL may do suitable amendment in PO on case to case basis for taking care the provision of VAT in case of project falling in the same State where manufacturing factory of the vendor is also located.

TERMS AND CONDITIONS

- Procurement of the subject package shall be done through e-procurement.
- Enquiry No., due date etc. must be legibly super scribed on the offers as per clause no. 2.0 of "Instructions to Bidders" of the General Conditions of Contract (GCC) Rev-06.
- Offers should be uploaded in two parts online at <https://bheleps.buyjunction.in> as follows:
 - Part-I Bid:** - Documents and Credential as per Technical PQR mentioned at Annexure-IV and Techno-Commercial offer (along with un-priced copy of un-priced bid and un-priced schedule of Technical-Commercial Deviation, Annexure I & VI). *For filling up of Un-priced bid, refer Instructions mentioned in Cl. No. 3 at Page 2 of NIT.*
 - Part II Bid:** - Price Bid. *For filling up of Un-priced bid, refer Instructions mentioned in Cl. No. 3 at Page 2 of NIT.*
- Terms and conditions: -
 - Part I bid will be opened on date & time mentioned in the NIT or subsequent corrigenda/amendments, if any.
 - Techno-commercial offer of only those bidders shall be evaluated who will meet the Technical pre-qualifying requirement of the tender.**
- Vendors shall quote in accordance with the requirements mentioned in the tender documents. In case of deviations (Technical/ Commercial), the same shall be highlighted separately giving Clause references along with the Cost of withdrawal of Deviations as per **Annexure-II to GCC Rev 06 of "DEVIATION SHEET (COST OF WITHDRAWAL)"** along with reasons for taking such deviations.
However, it may be noted that part bids/ incomplete offers may be rejected.
Bidder to note all the points mentioned in "Notes" of Annexure-II to GCC Rev 06.
- Please note the following:**
 - Price format is enclosed for compliance. (Annexure-I)**
 - SCC enclosed for compliance. (Annexure-II)**
 - GCC enclosed for compliance.****GCC Rev-06 is available at <http://www.bhelpem.com/Documents/GCC/GCC-Rev-06.pdf>. You are requested to kindly download the same.**

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7. Tenders shall be submitted strictly in accordance with the requirements of the above tender documents.
8. Standard pre-printed terms & conditions of the tenderers shall not be considered valid.
9. Validity of offer shall be as per **Clause No. 7.0, "Instructions to Bidders" of GCC Rev 06.**
10. Unsolicited fresh/revised Price Bids shall not be entertained.
11. Purchaser shall be under no obligation to accept the lowest or any other tender and shall be entitled to accept or reject any/all tender(s) in part or full without assigning any reason whatsoever.
12. Late tenders will be rejected.
13. Tenders and all correspondence thereof, shall be addressed to the undersigned by name & designation and sent at the following address:

Mr. KUNAL GANDHI, Sr. Engr./CMM M/s Bharat Heavy Electricals Ltd., Project Engineering Management, Power Project Engineering Institute, HRD & ESI Complex, Plot No 25, Sector-16 A, Noida-201301 Kind Attn: KUNAL GANDHI/ CMM E-MAIL: kunalgandhi@bhhelpem.co.in Ph. No. 0120-4368574/ 9650183377	Mr. I P SINGH, SR MANAGER, CMM M/s Bharat Heavy Electricals Ltd., Project Engineering Management, Power Project Engineering Institute, HRD & ESI Complex, Plot No 25, Sector-16 A, Noida-201301 Kind Attn: I P SINGH/ CMM E-MAIL: indra@bhhelpem.co.in Ph. No. 0120- 4218749, 09818989654
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14. **PRE-QUALIFICATION REQUIREMENT: -**
Bidders is requested to submit the documents satisfying the "TECHNICAL PRE-QUALIFYING REQUIREMENT" as per the conditions mentioned in the PQR.
Bids of only those bidders shall be evaluated who meet the Technical pre-qualifying requirements (if applicable).
Pre-qualifying requirement for the same is attached as Annexure-IV.
15. Bidders to note that their bid shall be conditional subject to qualify PQR by registered vendors & non-registered vendors have to qualify PQR & get registered with PEM for the package.
For registration in PEM "Bidders needs to apply & get registered for subject package with PEM before P-2 (price bid opening) & hence you need to apply online for registration on PEM web portal & have to enclose acknowledgement with this effect with the bid documents else your bid will not be considered for evaluation".
16. Limit on quantity variation shall be plus 30% of Contract Value (Ex Works) till validity of Rate Contract. The Purchaser shall have the right to increase or decrease quantities and scope up to the above extent of value and Seller/ Contractor shall be bound to accept the same at the contracted prices without any escalation.

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17. Project list is indicative only, BHEL may ask for delivery anywhere in India for any of the project added in the prospective project/ existing projects during RC period.
18. Bidder has to submit "NO DEVIATION CERTIFICATE FOR COMMERCIAL TERMS AND CONDITIONS AS PER GCC (06), SCC AND NIT". In case of deviations, bidder to clearly mention the same with their techno-commercial offer as per Point No-5 of Terms and Conditions at Page 3 of NIT.
19. All the above Tender Documents shall automatically become a part of the Order/Contract after its finalization.
20. **The offers of the bidders who are on the banned list as also the offer of the bidders, who engage the services of the banned firms, shall be rejected. The list of banned firms is available on BHEL website www.bhel.com.**
21. **"The 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."**
BHEL Fraud prevention policy is also uploaded in vendor's section on www.bhelpem.com.
22. **Bidders are requested to visit constantly our website to update them self for any technical or commercial change in the NIT.**
23. **All corrigenda, addenda, amendments, time extensions, clarifications etc. to the tender will be hosted on BHEL websites only (www.bhelpem.com, www.bhel.com & <https://bheleps.buyjunction.in>) under subject tender reference. Bidders are requested to visit our websites from time to time to keep themselves updated. **Bidders may go through the Sellers' manual & Help documents provided on E-Procurement Portal website & obtain required Digital Signature Certificate for participating in the subject Tender. For Bidders' convenience, the Helpdesk Nos. of E-Procurement Portal m-junction are also listed below:****

MJUNCTION HELPDESK Nos. 033-6601 1717, 9163348283 / 9163348284 / 9163348285 / 9163348286 / 8584008116 / 8584008205, eps.customercare@mjunction.in
CRM Contact Details:

Mr. Santosh Kumar - Cell No. 09717149600, santosh.kumar@mjunction.in

Ms. Rimi Ghosh – Cell No 09650044156, rimi.ghosh@mjunction.in

24. **CIF allocation is not applicable for this tender. Bidder to quote accordingly.**
25. Bidders to submit their offers strictly in line with the enclosed price format.

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26. Inspection shall be done by BHEL/ END CUSTOMER/Third party Agency (finalized by BHEL).
27. Any other taxes & duties applicable on the date of bid but not quoted by the bidders shall be to bidder account.
28. Delivery terms for dispatches shall be FOR Dispatch Station.
29. This enquiry is subject to Conditions/ limits if any imposed in PMD / Vendor registration.
30. Bidders participating through open tender will necessarily have to but class III DSCs issued by the certifying authorities in India. Basic procedure/ checklist is uploaded on www.bhel.com.
31. Non- registered bidder to submit the credentials required for Registration in BHEL PEM: -
"Online Registration Portal is operational in BHEL. Non-registered Vendors, who wish to apply for registration with BHEL-PEM, have to apply through Online Registration Portal available at www.bhelpem.com - vendor section - Online Supplier Registration. All credentials and/or documents duly signed and stamped related to registration has to be uploaded on the website and submit the application for registration. One set of hard copy of the filled-up SRF downloaded from Online Registration Portal duly signed and stamped has to be submitted."
32. Purchaser reserves the right to split up the scope of the tender enquiry and place the orders for different scope/ items with different bidders and also increase or decrease the quantity.
33. BHEL reserves the right to go for Reverse Auction (RA) (Guidelines as available on www.bhel.com) instead of opening the sealed envelope price bid, submitted by the bidder. This will be decided after techno-commercial evaluation. Bidders to give their acceptance with the offer for participation in RA. Non-acceptance to participate in RA may result in non-consideration of their bids, in case BHEL decides to go for RA.
Those bidders who have given their acceptance to participate in Reverse Auction will have to necessarily submit 'Process compliance form' (to the designated service provider) as well as 'Online sealed bid' in the Reverse Auction. Non-submission of 'Process compliance form' or 'Online sealed bid' by the agreed bidder(s) will be considered as tampering of the tender process and will invite action by BHEL as per extant guidelines for suspension of business dealings with suppliers/ contractors (as available on www.bhel.com).
The bidders have to necessarily submit online sealed bid less than or equal to their envelope sealed price bid already submitted to BHEL along with the offer. The envelope sealed price bid of successful L1 bidder in RA, if conducted, shall also be opened after RA and the order will be placed on lower of the two bids (RA closing price & envelope sealed price) thus obtained. The bidder having submitted this offer specifically agrees to this condition and undertakes to execute the contract on thus awarded rates.
If it is found that L1 bidder has quoted higher in online sealed bid in comparison to envelope sealed bid for any item(s), the bidder will be issued a warning letter to this effect. However, if the same bidder again

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defaults on this count in any subsequent tender in the unit, it will be considered as fraud and will invite action by BHEL as per extant guidelines for suspension of business dealings with suppliers/ contractors (as available on www.bhel.com)."

As a reminder to the bidders, system will flash following message (in RED Color) during the course of 'online sealed bid':

"Bidders to submit online sealed bid less than or equal to their envelope sealed bid already submitted to BHEL"

Detailed guidelines of reverse auction 2016 are available in "information section" of [www. bhelpem.com](http://www.bhelpem.com), same are applicable for subject tender.

The Bidders has to quote the Single Price (i.e. Total Cost to BHEL) in Reverse Auction. Price are to be inclusive of Packing & Forwarding charges, all the routine & type tests as per tender scope, ED + cess, CST against C-form/VAT, Freight as applicable, insurance charges, etc. including loading (if any). De-loading (if any) shall be done in line with SCC.

IMPORTANT INSTRUCTION TO BIDDERS IN CASE OF REVERSE AUCTION

The Bidders has to quote the Single Price (i.e. Total Cost to BHEL) in Reverse Auction i. e. Price mentioned in Column No. 19 for indigenous bidders with loading/de loading (if any). Price are to be inclusive of Packing & Forwarding charges, all the routine & type tests as per tender scope, ED + cess, CST against C-form/VAT, Freight as applicable, including loading (if any). De-loading (if any) shall be done in line with NIT terms.

Following Condition in Reverse Auction shall be treated as follows:

Case-I (Taxes & duties and freight are identical in Reverse Auction & Conventional Price Bid)

Resolution: - Ordering shall be done on lower of the two bids (RA closing price & Conventional Price Bid). After successful completion of reverse auction L1 bidder shall be asked to submit break up in line with taxes & duties, freight quoted in their Conventional Price Bid.

Case-II (In case Bidder has quoted 'CST' in Conventional Price Bid and applicable Tax is 'VAT')

Resolution: - "Total Cost to BHEL shall be maintained by reducing proportion amount in Ex-works quoted by Bidder".

Case-III (In case Bidder has quoted 'VAT' in Conventional Price Bid and applicable Tax is 'CST')

Resolution: - Conventional Bid/RA quoted Prices shall be reduced and CST will be allowed.

Statutory variation shall be applicable.

Any new tax structure (like Goods & Services Tax) as and when implemented by the Government shall become applicable in addition to or in lieu of existing tax structure.

Note: - Applicable taxes & duties shall be determined as per location of works of bidder.

Kindly consider the same while quoting the tender.

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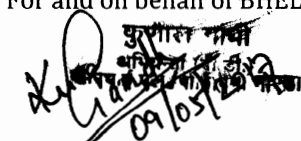
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34. L1 bidder will have to submit Bank Guarantee for each POs (irrespective of value) which will be placed under the Rate Contract finalised through this tender considering RA as original contract as per format mentioned in Annexure VI to NIT instead of format mentioned in GCC Rev 06.
The PBG Format has been attached as Annexure-VI-B.
35. Bidder to note that all other terms and condition shall be strictly as per NIT, GCC Rev. 06 & SCC. In the event of any contradiction in the terms and conditions mentioned, the order of preference shall be NIT (this letter) / SCC / GCC Rev. 06.
36. "If any bidder uploads price bid in the unpriced section (techno-commercial attachment page) of the tender in e-procurement, in that case bidder(s) shall only be responsible for such mistake and any consequences thereof. Hence all bidders are requested to be more careful at the time of uploading the Unpriced and Price Bid for Part-I and Part-II respectively to avoid mismatch".

Note: Tenderer must submit UN-PRICED Price format duly filled mentioning the word "QUOTED" in place of actual price given in sealed price bid.

Thanking you,
Yours faithfully,
For and on behalf of BHEL


09/05/2017

(Signature of official with Name & Designation)

Enclosures:

- a) NIT (this letter itself)
- b) Annexure-I: Price Format
- c) Annexure-II: Special Conditions of Rate Contract (SCC).
- d) Annexure-III: List of prospective projects
- e) Annexure-IV: PQR (Pre-qualifying Requirement)
- f) Annexure-V: Technical Specification No. PE-TS-RC-165-N004
- g) Annexure-VIA Cost of Withdrawal sheet (Annexure-II of GCC Rev. 06)
- h) Annexure-VIB PBG Format



PRICE SCHEDULE- Rate Contract of Self Cleaning Strainers

Sl.No	DESCRIPTIONS OF ITEMS									
A	Main Supply	Quantity (Sets of SCS for each type)	Unit Ex-Works price (for 1 Set of SCS) (Rs)	Total Ex-Works (Rs.)	ED (Including cess) (Rs.)	CST against from C and form E	FREIGHT CHARGES (Including Service Tax) (Rs.)	TOTAL F.O.R. SITE PRICE (Rs.)	% allocation of Total ex-works value for each type SCS BOQ at Column 3.	
1	2	3	4	5	6	7	8	9=5+6+7+8	17	
1	Type 1	2	Derived	Derived	% TO BE QUOTED	% TO BE QUOTED	% TO BE QUOTED	Derived	7.49	
2	Type 2	8	Derived	Derived	% TO BE QUOTED	% TO BE QUOTED		Derived	31.27	
3	Type 3	2	Derived	Derived	% TO BE QUOTED	% TO BE QUOTED		Derived	11.40	
4	Type 4	4	Derived	Derived	% TO BE QUOTED	% TO BE QUOTED		Derived	33.88	
5	Type 5	2	Derived	Derived	% TO BE QUOTED	% TO BE QUOTED		Derived	15.96	
A		18		TO BE QUOTED	Derived	Derived	Derived	Derived	100.00	
B	EXPECTED SPARES	No of Sets	Unit Ex-Works price	Total Ex-Works (Rs.)	ED (Including cess) (Rs.)	CST against from C and form E	FREIGHT CHARGES (Including Service Tax) (Rs.)	TOTAL F.O.R. SITE PRICE (Rs.)		
B1	Total Ex-works of Expected Spares for TYPE-1 SCS as specified in Annexure-A. [The quantity mentoned in Annexure-A refers to the TOTAL quantity of Spares required for Type-1 SCS]	1 SET		Derived	% TO BE QUOTED	% TO BE QUOTED	% TO BE QUOTED	Derived	For deriving price of each TYPE of spares Refer Annex-A for % allocation	
B2	Total Ex-works of Expected Spares for TYPE-2 SCS as specified in Annexure-A. [The quantity mentoned in Annexure-A refers to the TOTAL quantity of Spares required for Type-2 SCS]	1 SET		Derived				Derived		
B3	Total Ex-works of Expected Spares for TYPE-3 SCS as specified in Annexure-A. [The quantity mentoned in Annexure-A refers to the TOTAL quantity of Spares required for Type-3 SCS]	1 SET		Derived				Derived		
B4	Total Ex-works of Expected Spares for TYPE-4 SCS as specified in Annexure-A. [The quantity mentoned in Annexure-A refers to the TOTAL quantity of Spares required for Type-4 SCS]	1 SET		Derived				Derived		
B5	Total Ex-works of Expected Spares for TYPE-5 SCS as specified in Annexure-A. [The quantity mentoned in Annexure-A refers to the TOTAL quantity of Spares required for Type-5 SCS]	1 SET		Derived				Derived		
B	B1+B2+B3+B4+B5			Derived				Derived		
C	COST OF SERVICE AT SITE	No of Visit	Ex Works PRICE per Visit	Total Ex-Works (Rs.)	NA	Service Tax	NA	TOTAL Price including Service tax (Rs.)		
C1	SUPERVISION CHARGE PER VISIT (ONE VISIT CONSISTS OF 4 DAYS STAY AT SITE)									For deriving price of each type of services Refer Annex-B for % allocation
C1.1	Type 1	2	Derived	Derived		% TO BE QUOTED		Derived		
C1.2	Type 2	8	Derived	Derived		% TO BE QUOTED		Derived		
C1.3	Type 3	2	Derived	Derived		% TO BE QUOTED		Derived		
C1.4	Type 4	4	Derived	Derived		% TO BE QUOTED		Derived		
C1.5	Type 5	2	Derived	Derived		% TO BE QUOTED		Derived		
C2	PER DAY CHARGE FOR STAYING EXTRA/ LESS NUMBER OF DAYS AT SITE									
C2.1	Type 1	-	Derived	Derived		% TO BE QUOTED		Derived		
C2.2	Type 2	-	Derived	Derived		% TO BE QUOTED		Derived		
C2.3	Type 3	-	Derived	Derived		% TO BE QUOTED		Derived		
C2.4	Type 4	-	Derived	Derived		% TO BE QUOTED		Derived		
C2.5	Type 5	-	Derived	Derived		% TO BE QUOTED		Derived		
C	C1+C2		Derived	Derived		Derived		Derived		
D	GRAND TOTAL COST to BHEL (A+B+C)							Derived		
Note:										
1	ONE SITE VISITS OF FOUR (4) DAYS EACH HAS BEEN CONSIDERED IN C1 FOR INSTALLATION CHECK, COMMISSIONING, TRAIL RUN AND PG TESTING FOR ONE (1) NOS SCS. THE PRICES SHALL BE INCLUSIVE OF CHARGES OF TRAVELLING, BOARDING/LODGING, MEDICAL, INSURANCE ETC.									
2	SITE CERTIFICATION SHALL BE REQUIRED IN CALCULATION OF "COST OF SERVICE AT SITE" MENTIONED AT C WHETHER EXTRA STAY/ LESS STAY.									
3	IN CASE OF NON-COMPLETION OF INSTALLATION CHECK, COMMISSIONING, TRAIL RUN AND PG TESTING IN SITE VISITS STIPULATED AT NOTE NO. 1 ABOVE, FOR ANY REASONS NOT ATTRIBUTABLE TO VENDOR (TO BE CERTIFIED BY BHEL SITE), VENDOR SHALL COMPLETE ABOVE ACTIVITIES IN SUBSEQUENT SITE VISITS FOR WHICH COST SHALL BE BORNE BY BHEL ON PRO-RATA BASIS ON PRICE OF SITE VISIT QUOTED BY BIDDER.									
4	PRICES OF ALL ACCESSORIES , COMMISSIONING & ERECTION SPARES , SPECIAL TOOLS & TACKLES AND OTHER ACCESSORIES NOT LISTED ABOVE SHALL BE INCLUDED IN THE PRICE OF SCS & SHALL BE SUPPLIED WITH THE SCS.									
5	VALUE IS TO BE FILLED ONLY WHERE "TO BE QUOTED" IS MENTIONED AND FOR OTHER COLUMNS WHERE "DERIVED" IS MENTIONED SAME SHALL BE DERIVED BY BHEL AS PER % ALLOCATION FIXED .SPARES & SERVICES PRICES SHALL ALSO BE DERIVED BY BHEL AS PER % ALLOCATION SPECIFIED.									
6	FOR SIMPLICITY, THE CELLS WHERE SUPPLIER IS REQUIRED TO FILL THE VALUES HAVE BEEN HIGHLIGHTED IN YELLOW.									
7	FURTHER, SUPPLIER TO QUOTE PERCENTAGES FOR ED, CST AND FREIGHT WHICH SHALL BE USED TO DERIVE TOTAL F.O.R. PRICE.									
8	PLEASE REFER TECHNICAL SPECIFICATION PE-TS-RC-165-N004 FOR DETAILS.									
9	BOQ MENTINED IN THE SPARESE LIST (Annexure- A) IS TENTATVE AND MAY VARY DURING THE PROJECT EXECUTION..									



RATE CONTRACT - PRICE SCHEDULE FOR SPARES OF SCS-EACH TYPE				SPECIFICATION NO: PE-TS-RC-405- N004	
Spares -- Annexure-II					
DESCRIPTION OF EQUIPMENT / ITEM Spares to be supplied under this specification.		DESCRIPTION OF UNIT OF MEASUREMENT	UOM	QUANTITY OF EXPECTED SPARES AS PER DATA SHEET- A OF SECTION - ID	Percentage wise (%) Breakup wrt to Unit Ex- works Cost of 1 set of SCS
1		2		3	
SPARES OF TYPE-1					
Mandatory Spares for Electronic Transmitters (for pressure ,) and Electrical Transducers.					
Transmitters and Electrical Transducers (10% of total number of offered for each model and type for the project or a minimum of one number, whichever is more)		Numbers=Nos.	Nos.	1	2.09
Mandatory spares for local gauges (for Pressure, DPG,)					
Local gauges/ Switch (for Pressure, DP, Temperature, Flow, level , etc.) (10% of total number of instruments offered for each model and type for the project or a minimum of one number, whichever is more.)		Numbers=Nos.	Nos.	1	0.87
Mandatory Spares for Control Panels / Desks					
Crimping pins		Roll	Roll	1	0.09
Bulbs for indicating Lights (Three times. the One hundred percent replacement)		Lot	Lot	1	0.17
Control circuit fuses for each current rating (Three times. the One hundred percent replacement)		Lot	Lot	1	0.09
Push Button , electrical control switches and push buttons etc.		(20 % qty Installed of each type of SCS= 1 Lot)	Lot	1	0.04
415 V Motor					
Terminal plates		(10 Nos. each for small motors upto 30 kW = 1 Lot)	Lot	1	0.87
Heaters		(2set for each Type of SCS= 1 lot)	Lot	1	0.22
Greasing arrangements		4 set of each type of motor = 1 lot)	set	1	0.09
Motor of each type and rating		(10% qty Installed or minm 1 no whichever higher of each type of SCS= 1 Lot)	Lot	1	0.87
Bearings (DE and NDE) for each type and rating of motor		4 set of each type of SCS = 1 lot)	Set	1	1.04
C&I Spares					
Each type of lamps, PBs, ILPBs, fuse, MCB, MCCB used in the equipment/system.		(20%) installed of each type for each type of SCS.= 1 LOT)	Lot	1	0.43
Measuring Instruments - Indicators,Recorders, Electrical Metering and Skid Mounted Instruments					



RATE CONTRACT - PRICE SCHEDULE FOR SPARES OF SCS-EACH TYPE				SPECIFICATION NO: PE-TS-RC-405- N004	
Spares -- Annexure-II					
DESCRIPTION OF EQUIPMENT / ITEM Spares to be supplied under this specification.		DESCRIPTION OF UNIT OF MEASUREMENT	UOM	QUANTITY OF EXPECTED SPARES AS PER DATA SHEET-A OF SECTION - ID	Percentage wise (%) Breakup wrt to Unit Ex- work Cost of 1 set of SCS
Indicators, recorders and meters offered from each model for the project. These instruments shall be supplied with three sets of blank scales.		(10% of installed of each type/Model or minimum of one no for each model and type for each type of SCS = 1LOT)	Lot	1	0.13
Skid mounted instruments (if any)		(10% of total no. of instruments for each model or minimum one no for each model and type whichever is more for each type of SCS.= 1 LOT)	Lot	1	0.17
Temperature, Transmitters and Electronic Transmitters (For Pressure, DP, Temp, Flow, Level), Temperature, Pressure, Flow & Level Switch, safety switches, Gauges, meters, Transducer or any other instrument etc.		(10% of total number of Instruments/transducers offered for each model and type for each type of SCS, whichever is more = 1 Lot)	Lot	1	4.35
Relay based Control Panels					
LEDs for indicating lights		(10% qty installe for each type of SCS= 1 Lot)	Lot	1	0.17
Control circuit fuses/MCB/MCCB		(Three Times, 300% of installed of each current rating for each Type of SCS.= 1 Lot)	Lot	1	0.17
Relays modules & contactors.		(20% qty Installed of each type of SCS= 1 Lot)	Lot	1	0.43
Alarm Annunciation System					
logic modules, group card modules, power supply modules, Hooters and any other electronic module.		(20% for each type Installed for each type of SCS= 1 Lot)	Lot	1	2.17
un-engraved window boxes complete with LED etc.		(5% spares of each type Installed for each Type of SCS= 1 Lot)	Lot	1	0.43
LEDs for annunciation facia windows and LEDs box assemblies offered for the project		(20% qty Installed for each type of SCS= 1 Lot)	Lot	1	0.09
Annunciator hooter		one (1) No of each Typeof SCS =Nos.	Nos.	1	0.17
Erection Hardware					
Instrument valves, manifold for each type, rating, model number and size of devices supplied for the project		(10% qty Installed of each Type & Size for each type of SCS= 1 Lot)	Lot	1	0.43
Condensate pots of each type & Size installed		(10% of total number of installed or four numbers whichever is higher fo reach type of SCS= 1 Lot)	Lot	1	0.43
Fittings		(10% qty Installed of each Type & size for each type of SCS= 1 Lot)	Lot	1	0.43
SPARES OF TYPE-2					
Mandatory Spares for Electronic Transmitters (for pressure ,) and Electrical Transducers.					



RATE CONTRACT - PRICE SCHEDULE FOR SPARES OF SCS-EACH TYPE				SPECIFICATION NO: PE-TS-RC-405- N004	
Spares -- Annexure-II					
DESCRIPTION OF EQUIPMENT / ITEM Spares to be supplied under this specification.		DESCRIPTION OF UNIT OF MEASUREMENT	UOM	QUANTITY OF EXPECTED SPARES AS PER DATA SHEET- A OF SECTION - ID	Percentage wise (%) Breakup wrt to Unit Ex- works Cost of 1 set of SCS
Transmitters and Electrical Transducers (10% of total number of offered for each model and type for the project or a minimum of one number, whichever is more)		Numbers=Nos.	Nos.	2	2.00
Mandatory spares for local gauges (for Pressure, DPG,)					
Local gauges/ Switch (for Pressure, DP, Temperature, Flow, level , etc.) (10% of total number of instruments offered for each model and type for the project or a minimum of one number, whichever is more.)		Numbers=Nos.	Nos.	2	0.83
Mandatory Spares for Control Panels / Desks					
Crimping pins		Roll	Roll	2	0.08
Bulbs for indicating Lights (Three times. the One hundred percent replacement)		Lot	Lot	2	0.17
Control circuit fuses for each current rating (Three times. the One hundred percent replacement)		Lot	Lot	2	0.08
Push Button , electrical control switches and push buttons etc.		(20 % qty Installed of each type of SCS= 1 Lot)	Lot	2	0.04
415 V Motor					
Terminal plates		(10 Nos. each for small motors upto 30 kW = 1 Lot)	Lot	1	0.83
Heaters		(2set for each Type of SCS= 1 lot)	Lot	1	0.21
Greasing arrangements		4 set of each type of motor = 1 lot)	set	1	0.08
Motor of each type and rating		(10% qty Installed or minm 1 no whichever higher of each type of SCS= 1 Lot)	Lot	1	0.83
Bearings (DE and NDE) for each type and rating of motor		4 set of each type of SCS = 1 lot)	Set	1	1.00
C&I Spares					
Each type of lamps, PBs, ILPBs, fuse, MCB, MCCB used in the equipment/system.		(20%) installed of each type for each type of SCS.= 1 LOT)	Lot	1	0.42
Measuring Instruments - Indicators,Recorders, Electrical Metering and Skid Mounted Instruments					
Indicators, recorders and meters offered from each model for the project. These instruments shall be supplied with three sets of blank scales.		(10% of installed of each type/Model or minimum of one no for each model and type for each type of SCS = 1LOT)	Lot	1	0.13



RATE CONTRACT - PRICE SCHEDULE FOR SPARES OF SCS-EACH TYPE	SPECIFICATION NO: PE-TS-RC-405- N004
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Spares -- Annexure-II

	DESCRIPTION OF EQUIPMENT / ITEM Spares to be supplied under this specification.	DESCRIPTION OF UNIT OF MEASUREMENT	UOM	QUANTITY OF EXPECTED SPARES AS PER DATA SHEET-A OF SECTION - ID	Percentage wise (%) Breakup wrt to Unit Ex- works Cost of 1 set of SCS
4.2.2	Skid mounted instruments (if any)	(10% of total no. of instruments for each model or minimum one no for each model and type whichever is more for each type of SCS.= 1 LOT)	Lot	1	0.17
4.3.3	Temperature, Transmitters and Electronic Transmitters (For Pressure, DP, Temp, Flow, Level), Temperature, Pressure, Flow & Level Switch, safety switches, Gauges, meters, Transducer or any other instrument etc.	(10% of total number of Instruments/transducers offered for each model and type for each type of SCS, whichever is more = 1 Lot)	Lot	1	4.17
4.4	Relay based Control Panels				
4.4.1	LEDs for indicating lights	(10% qty installe for each type of SCS= 1 Lot)	Lot	1	0.17
4.4.2	Control circuit fuses/MCB/MCCB	(Three Times, 300% of installed of each current rating for each Type of SCS.= 1 Lot)	Lot	1	0.17
4.4.3	Relays modules & contactors.	(20% qty Installed of each type of SCS= 1 Lot)	Lot	1	0.42
4.5	Alarm Annunciation System				
4.5.1	logic modules, group card modules, power supply modules, Hooters and any other electronic module.	(20% for each type Installed for each type of SCS= 1 Lot)	Lot	1	2.08
4.5.2	un-engraved window boxes complete with LED etc.	(5% spares of each type Installed for each Type of SCS= 1 Lot)	Lot	1	0.42
4.5.3	LEDs for annunciation facia windows and LEDs box assemblies offered for the project	(20% qty Installed for each type of SCS= 1 Lot)	Lot	1	0.08
4.5.4	Annunciator hooter	one (1) No of each Typeof SCS =Nos.	Nos.	1	0.17
4.6	Erection Hardware				
4.6.1	Instrument valves, manifold for each type, rating, model number and size of devices supplied for the project	(10% qty Installed of each Type & Size for each type of SCS= 1 Lot)	Lot	1	0.42
4.6.2	Condensate pots of each type & Size installed	(10% of total number of installed or four numbers whichever is higher fo reach type of SCS= 1 Lot)	Lot	1	0.42
4.6.3	Fittings	(10% qty Installed of each Type & size for each type of SCS= 1 Lot)	Lot	1	0.42

C SPARES OF TYPE- 3

1.0	Mandatory Spares for Electronic Transmitters (for pressure ,) and Electrical Transducers.				
1.1	Transmitters and Electrical Transducers (10% of total number of offered for each model and type for the project or a minimum of one number, whichever is more)	Numbers=Nos.	Nos.	1	1.37



RATE CONTRACT - PRICE SCHEDULE FOR SPARES OF SCS-EACH TYPE				SPECIFICATION NO: PE-TS-RC-405- N004	
Spares -- Annexure-II					
DESCRIPTION OF EQUIPMENT / ITEM Spares to be supplied under this specification.		DESCRIPTION OF UNIT OF MEASUREMENT	UOM	QUANTITY OF EXPECTED SPARES AS PER DATA SHEET-A OF SECTION - ID	Percentage wise (%) Breakup wrt to Unit Ex- works Cost of 1 set of SCS
Mandatory spares for local gauges (for Pressure, DPG,)					
Local gauges/ Switch (for Pressure, DP, Temperature, Flow, level , etc.) (10% of total number of instruments offered for each model and type for the project or a minimum of one number, whichever is more.)		Numbers=Nos.	Nos.	1	0.57
Mandatory Spares for Control Panels / Desks					
Crimping pins		Roll	Roll	1	0.06
Bulbs for indicating Lights (Three times. the One hundred percent replacement)		Lot	Lot	1	0.11
Control circuit fuses for each current rating (Three times. the One hundred percent replacement)		Lot	Lot	1	0.06
Push Button , electrical control switches and push buttons etc.		(20 % qty Installed of each type of SCS= 1 Lot)	Lot	1	0.03
415 V Motor					
Terminal plates		(10 Nos. each for small motors upto 30 kW = 1 Lot)	Lot	1	0.57
Heaters		(2set for each Type of SCS= 1 lot)	Lot	1	0.14
Greasing arrangements		4 set of each type of motor = 1 lot)	set	1	0.06
Motor of each type and rating		(10% qty Installed or minm 1 no whichever higher of each type of SCS= 1 Lot)	Lot	1	0.57
Bearings (DE and NDE) for each type and rating of motor		4 set of each type of SCS = 1 lot)	Set	1	0.69
C&I Spares					
Each type of lamps, PBs, ILPBs, fuse, MCB, MCCB used in the equipment/system.		(20%) installed of each type for each type of SCS.= 1 LOT)	Lot	1	0.29
Measuring Instruments - Indicators,Recorders, Electrical Metering and Skid Mounted Instruments					
Indicators, recorders and meters offered from each model for the project. These instruments shall be supplied with three sets of blank scales.		(10% of installed of each type/Model or minimum of one no for each model and type for each type of SCS = 1LOT)	Lot	1	0.09
Skid mounted instruments (if any)		(10% of total no. of instruments for each model or minimum one no for each model and type whichever is more for each type of SCS.= 1 LOT)	Lot	1	0.11



RATE CONTRACT - PRICE SCHEDULE FOR SPARES OF SCS-EACH TYPE				SPECIFICATION NO: PE-TS-RC-405- N004	
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Spares -- Annexure-II

	DESCRIPTION OF EQUIPMENT / ITEM Spares to be supplied under this specification.	DESCRIPTION OF UNIT OF MEASUREMENT	UOM	QUANTITY OF EXPECTED SPARES AS PER DATA SHEET-A OF SECTION - ID	Percentage wise (%) Breakup wrt to Unit Ex- works Cost of 1 set of SCS
4.3.3	Temperature, Transmitters and Electronic Transmitters (For Pressure, DP, Temp, Flow, Level), Temperature, Pressure, Flow & Level Switch, safety switches, Gauges, meters, Transducer or any other instrument etc.	(10% of total number of Instruments/transducers offered for each model and type for each type of SCS, whichever is more = 1 Lot)	Lot	1	2.86
4.4	Relay based Control Panels				
4.4.1	LEDs for indicating lights	(10% qty installe for each type of SCS= 1 Lot)	Lot	1	0.11
4.4.2	Control circuit fuses/MCB/MCCB	(Three Times, 300% of installed of each current rating for each Type of SCS.= 1 Lot)	Lot	1	0.11
4.4.3	Relays modules & contactors.	(20% qty Installed of each type of SCS= 1 Lot)	Lot	1	0.29
4.5	Alarm Annunciation System				
4.5.1	logic modules, group card modules, power supply modules, Hooters and any other electronic module.	(20% for each type Installed for each type of SCS= 1 Lot)	Lot	1	1.43
4.5.2	un-engraved window boxes complete with LED etc.	(5% spares of each type Installed for each Type of SCS= 1 Lot)	Lot	1	0.29
4.5.3	LEDs for annunciation facia windows and LEDs box assemblies offered for the project	(20% qty Installed for each type of SCS= 1 Lot)	Lot	1	0.06
4.5.4	Annunciator hooter	one (1) No of each Typeof SCS =Nos.	Nos.	1	0.11
4.6	Erection Hardware				
4.6.1	Instrument valves, manifold for each type, rating, model number and size of devices supplied for the project	(10% qty Installed of each Type & Size for each type of SCS= 1 Lot)	Lot	1	0.29
4.6.2	Condensate pots of each type & Size installed	(10% of total number of installed or four numbers whichever is higher fo reach type of SCS= 1 Lot)	Lot	1	0.29
4.6.3	Fittings	(10% qty Installed of each Type & size for each type of SCS= 1 Lot)	Lot	1	0.29

D SPARES OF TYPE-4

1.0	Mandatory Spares for Electronic Transmitters (for pressure ,) and Electrical Transducers.				
1.1	Transmitters and Electrical Transducers (10% of total number of offered for each model and type for the project or a minimum of one number, whichever is more)	Numbers=Nos.	Nos.	1	0.92
2.0	Mandatory spares for local gauges (for Pressure, DPG,)				



RATE CONTRACT - PRICE SCHEDULE FOR SPARES OF SCS-EACH TYPE				SPECIFICATION NO: PE-TS-RC-405- N004	
Spares -- Annexure-II					
DESCRIPTION OF EQUIPMENT / ITEM Spares to be supplied under this specification.		DESCRIPTION OF UNIT OF MEASUREMENT	UOM	QUANTITY OF EXPECTED SPARES AS PER DATA SHEET- A OF SECTION - ID	Percentage wise (%) Breakup wrt to Unit Ex- works Cost of 1 set of SCS
Local gauges/ Switch (for Pressure, DP, Temperature, Flow, level , etc.) (10% of total number of instruments offered for each model and type for the project or a minimum of one number, whichever is more.)		Numbers=Nos.	Nos.	1	0.38
Mandatory Spares for Control Panels / Desks					
Crimping pins		Roll	Roll	1	0.04
Bulbs for indicating Lights (Three times. the One hundred percent replacement)		Lot	Lot	1	0.08
Control circuit fuses for each current rating (Three times. the One hundred percent replacement)		Lot	Lot	1	0.04
Push Button , electrical control switches and push buttons etc.		(20 % qty Installed of each type of SCS= 1 Lot)	Lot	1	0.02
415 V Motor					
Terminal plates		(10 Nos. each for small motors upto 30 kW = 1 Lot)	Lot	2	0.38
Heaters		(2set for each Type of SCS= 1 lot)	Lot	2	0.10
Greasing arrangements		4 set of each type of motor = 1 lot)	set	2	0.04
Motor of each type and rating		(10% qty Installed or minm 1 no whichever higher of each type of SCS= 1 Lot)	Lot	2	0.38
Bearings (DE and NDE) for each type and rating of motor		4 set of each type of SCS = 1 lot)	Set	2	0.46
C&I Spares		2			
Each type of lamps, PBs, ILPBs, fuse, MCB, MCCB used in the equipment/system.		(20%) installed of each type for each type of SCS.= 1 LOT)	Lot	2	0.19
Measuring Instruments - Indicators,Recorders, Electrical Metering and Skid Mounted Instruments		2			
Indicators, recorders and meters offered from each model for the project. These instruments shall be supplied with three sets of blank scales.		(10% of installed of each type/Model or minimum of one no for each model and type for each type of SCS = 1LOT)	Lot	2	0.06
Skid mounted instruments (if any)		(10% of total no. of instruments for each model or minimum one no for each model and type whichever is more for each type of SCS.= 1 LOT)	Lot	2	0.08
Temperature, Transmitters and Electronic Transmitters (For Pressure, DP, Temp, Flow, Level), Temperature, Pressure, Flow & Level Switch, safety switches, Gauges, meters, Transducer or any other instrument etc.		(10% of total number of Instruments/transducers offered for each model and type for each type of SCS, whichever is more = 1 Lot)	Lot	2	1.92
Relay based Control Panels					



RATE CONTRACT - PRICE SCHEDULE FOR SPARES OF SCS-EACH TYPE	SPECIFICATION NO: PE-TS-RC-405- N004
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Spares -- Annexure-II

	DESCRIPTION OF EQUIPMENT / ITEM Spares to be supplied under this specification.	DESCRIPTION OF UNIT OF MEASUREMENT	UOM	QUANTITY OF EXPECTED SPARES AS PER DATA SHEET- A OF SECTION - ID	Percentage wise (%) Breakup wrt to Unit Ex- works Cost of 1 set of SCS
4.4.1	LEDs for indicating lights	(10% qty installe for each type of SCS= 1 Lot)	Lot	2	0.08
4.4.2	Control circuit fuses/MCB/MCCB	(Three Times, 300% of installed of each current rating for each Type of SCS.= 1 Lot)	Lot	2	0.08
4.4.3	Relays modules & contactors.	(20% qty Installed of each type of SCS= 1 Lot)	Lot	2	0.19
4.5	Alarm Annunciation System	2			
4.5.1	logic modules, group card modules, power supply modules, Hooters and any other electronic module.	(20% for each type Installed for each type of SCS= 1 Lot)	Lot	2	0.96
4.5.2	un-engraved window boxes complete with LED etc.	(5% spares of each type Installed for each Type of SCS= 1 Lot)	Lot	2	0.19
4.5.3	LEDs for annunciation facia windows and LEDs box assemblies offered for the project	(20% qty Installed for each type of SCS= 1 Lot)	Lot	2	0.04
4.5.4	Annunciator hooter	one (1) No of each Typeof SCS =Nos.	Nos.	2	0.08
4.6	Erection Hardware				
4.6.1	Instrument valves, manifold for each type, rating, model number and size of devices supplied for the project	(10% qty Installed of each Type & Size for each type of SCS= 1 Lot)	Lot	2	0.19
4.6.2	Condensate pots of each type & Size installed	(10% of total number of installed or four numbers whichever is higher fo reach type of SCS= 1 Lot)	Lot	2	0.19
4.6.3	Fittings	(10% qty Installed of each Type & size for each type of SCS= 1 Lot)	Lot	2	0.19

E SPARES OF TYPE-5

1.0	Mandatory Spares for Electronic Transmitters (for pressure ,) and Electrical Transducers.				
1.1	Transmitters and Electrical Transducers (10% of total number of offered for each model and type for the project or a minimum of one number, whichever is more)	Numbers=Nos.	Nos.	1	0.98
2.0	Mandatory spares for local gauges (for Pressure, DPG,)				
2.1.	Local gauges/ Switch (for Pressure, DP, Temperature, Flow, level , etc.) (10% of total number of instruments offered for each model and type for the project or a minimum of one number, whichever is more.)	Numbers=Nos.	Nos.	1	0.41



RATE CONTRACT - PRICE SCHEDULE FOR SPARES OF SCS-EACH TYPE	SPECIFICATION NO: PE-TS-RC-405- N004
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Spares -- Annexure-II

	DESCRIPTION OF EQUIPMENT / ITEM Spares to be supplied under this specification.	DESCRIPTION OF UNIT OF MEASUREMENT	UOM	QUANTITY OF EXPECTED SPARES AS PER DATA SHEET- A OF SECTION - ID	Percentage wise (%) Breakup wrt to Unit Ex- works Cost of 1 set of SCS
2.3	Mandatory Spares for Control Panels / Desks				
2.3.1	Crimping pins	Roll	Roll	1	0.04
2.3.2	Bulbs for indicating Lights (Three times. the One hundred percent replacement)	Lot	Lot	1	0.08
2.3.3	Control circuit fuses for each current rating (Three times. the One hundred percent replacement)	Lot	Lot	1	0.04
2.3.4	Push Button , electrical control switches and push buttons etc.	(20 % qty Installed of each type of SCS= 1 Lot)	Lot	1	0.02
3.0	415 V Motor				
3.1	Terminal plates	(10 Nos. each for small motors upto 30 kW = 1 Lot)	Lot	1	0.41
3.2	Heaters	(2set for each Type of SCS= 1 lot)	Lot	1	0.10
3.3	Greasing arrangements	4 set of each type of motor = 1 lot)	set	1	0.04
3.4	Motor of each type and rating	(10% qty Installed or minm 1 no whichever higher of each type of SCS= 1 Lot)	Lot	1	0.41
3.5	Bearings (DE and NDE) for each type and rating of motor	4 set of each type of SCS = 1 lot)	Set	1	0.49
4.0	C&I Spares				
4.1	Each type of lamps, PBs, ILPBs, fuse, MCB, MCCB used in the equipment/system.	(20%) installed of each type for each type of SCS.= 1 LOT)	Lot	1	0.20
4.2	Measuring Instruments - Indicators,Recorders, Electrical Metering and Skid Mounted Instruments				
4.2.1	Indicators, recorders and meters offered from each model for the project. These instruments shall be supplied with three sets of blank scales.	(10% of installed of each type/Model or minimum of one no for each model and type for each type of SCS = 1LOT)	Lot	1	0.06
4.2.2	Skid mounted instruments (if any)	(10% of total no. of instruments for each model or minimum one no for each model and type whichever is more for each type of SCS.= 1 LOT)	Lot	1	0.08
4.3.3	Temperature, Transmitters and Electronic Transmitters (For Pressure, DP, Temp, Flow, Level), Temperature, Pressure, Flow & Level Switch, safety switches, Gauges, meters, Transducer or any other instrument etc.	(10% of total number of Instruments/transducers offered for each model and type for each type of SCS, whichever is more = 1 Lot)	Lot	1	2.04
4.4	Relay based Control Panels				
4.4.1	LEDs for indicating lights	(10% qty installe for each type of SCS= 1 Lot)	Lot	1	0.08
4.4.2	Control circuit fuses/MCB/MCCB	(Three Times, 300% of installed of each current rating for each Type of SCS.= 1 Lot)	Lot	1	0.08
4.4.3	Relays modules & contactors.	(20% qty Installed of each type of SCS= 1 Lot)	Lot	1	0.20

**RATE CONTRACT - PRICE SCHEDULE FOR SPARES OF SCS-EACH TYPE****SPECIFICATION NO:
PE-TS-RC-405- N004****Spares -- Annexure-II**

	DESCRIPTION OF EQUIPMENT / ITEM Spares to be supplied under this specification.	DESCRIPTION OF UNIT OF MEASUREMENT	UOM	QUANTITY OF EXPECTED SPARES AS PER DATA SHEET-A OF SECTION - ID	Percentage wise (%) Breakup wrt to Unit Ex- works Cost of 1 set of SCS
4.5	Alarm Annunciation System				
4.5.1	logic modules, group card modules, power supply modules, Hooters and any other electronic module.	(20% for each type Installed for each type of SCS= 1 Lot)	Lot	1	1.02
4.5.2	un-engraved window boxes complete with LED etc.	(5% spares of each type Installed for each Type of SCS= 1 Lot)	Lot	1	0.20
4.5.3	LEDs for annunciation facia windows and LEDs box assemblies offered for the project	(20% qty Installed for each type of SCS= 1 Lot)	Lot	1	0.04
4.5.4	Annunciator hooter	one (1) No of each Typeof SCS =Nos.	Nos.	1	0.08
4.6	Erection Hardware				
4.6.1	Instrument valves, manifold for each type, rating, model number and size of devices supplied for the project	(10% qty Installed of each Type & Size for each type of SCS= 1 Lot)	Lot	1	0.20
4.6.2	Condensate pots of each type & Size installed	(10% of total number of installed or four numbers whichever is higher fo reach type of SCS= 1 Lot)	Lot	1	0.20
4.6.3	Fittings	(10% qty Installed of each Type & size for each type of SCS= 1 Lot)	Lot	1	0.20
	Notes for Spares:				

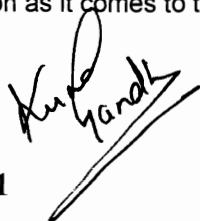
Bidders not to quote prices for above spares in this sheet, same shall be derived by BHEL based on % allocation given for spares specified against each type of SCS above.

ANNEXURE-B

Cost of Services in Percentage w.r.t Ex-works price of each type of Self Cleaning Strainer						
S. No.	SERVICES AT SITE	TYPE 1	TYPE 2	TYPE 3	TYPE 4	TYPE 5
C1	Cost of site visit for each type of SCS (in percentage w.r.t Total price of SCS of main supply) for Installation Checks, commissioning , trial run and PG Testing) (Note: 1 Set = 1 no. site visit for 4 days = 4 MANDAYS at site)	0.33%	1.30%	0.33%	0.65%	0.33%
C2	Per Day Charge for staying extra/ less number of days at site for each type of SCS(in percentage w.r.t Total price of SCS of main supply)	0.02%	0.02%	0.02%	0.02%	0.02%

Special Condition of Rate Contract for Self Cleaning Strainers

1. BHEL/PEM intends to enter into Rate Contract for the tendered 5 types of Self Cleaning Strainers for a period of two years. The Rate Contract shall come into force from the date of issue of Purchase order for Rate Contract.
2. The items will be required against respective projects. Exact quantities and Project name shall be intimated while placing order for a specific project based on the Rate Contract.
3. The units rate for each item should be quoted inclusive of ex-works including packing & forwarding (excepted sea worthy packing) for tendered specifications/sizes as per price schedule format. Other elements of prices such as Excise Duty, Sales Tax, and freight charges (Including service tax) % of Ex-works are also to be indicated. Destination may be anywhere in India as per project requirement.
4. The freight charges shall be paid on percentage on ex-works prices or actual freight charges paid to transporter whichever is lower against production of documentary evidence. Vendor to quote freight charges as percentage (%) of ex-works price for destination anywhere in India.
5. Vendor to note that Excise Duty is payable on self manufacturing item only as per clause no 4.1.2 of GCC Rev 06 & hence for their BOI may quote Excise Duty is inclusive or Nil.
6. The prices shall remain firm during the period of two years.
7. Inspection of materials shall be carried out by BHEL / CQA and or by Customer or by an authorized agency at manufacture's works before dispatch, if required. Dispatch of material to be done, only after receipt of BHEL/Customer MDCC. It is responsibility of vendor to for obtain Material Dispatch Clearance Certificate (MDCC) from BHEL or CUSTOMER as required before dispatch of material.
8. Items have to be manufactured as per specification and supplied strictly in accordance with the approved BHEL / Customer's Drawings & Quality Plan. The items/ test certificate of items, which for any reason are not acceptable to BHEL / Customer, shall be required to be retested. No extra charge shall be payable on those account by BHEL.
9. Mode dispatch shall be by road through Schedule Bank/BHEL (PEM) approved transporters.
10. Other terms and conditions shall be as per Standard Technical specification no. PE-TS-RC-165-N004 & GCC Rev 06, Enquiry letter.
11. Order shall be placed with CST for respective projects keeping FOR site price same, vendors to quote accordingly.
12. This enquiry is subject to Conditions/ limits if any imposed in PMD/ Vendor registration.
13. Tentative quantity is given in enquiry.
14. Bidders to submit offer for RC of said items ONLINE via e-Procurement System only. Complete tender in all respects duly signed & stamped on each and every page by the authorized signatory of the bidder as a token of acceptance of all the terms and conditions of tender.
15. The Bidder along with its associate/ collaborators/ sub-contractors/ sub-vendor/ 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 as soon as it comes to their notice.



LISTS OF PROJECTS FOR SELF CLEANING STRAINERS PACKAGE (PROPOSED)

With reference to proposed execution of rate contract of Self Cleaning Strainers package, the indicative list of projects as on date are listed below:

S.No	Project List
1	1x250 MW ROURKELA APP-II EXPANSION
2	4X270 MW BHADRADRI TPS
3	1x525 MW TUTICORIN TPS
4	2x660 MW ENNORE SEZ STPP
5	1x800 MW NORTH CHENNAI ST III BTG

It may be noted that project list is indicative only, BHEL may ask for delivery anywhere in India for any of the project added in the prospective project list/ requirement of existing projects during RC period.

	PRE - QUALIFYING REQUIREMENTS (TECHNICAL)	DOCUMENT NO: PE-TS-XXX-YYY-ZZZZ
		REVISION NO: 0 DATE: 24.04.17
		SHEET: 1 of 1
ENQUIRY NO:		
PROJECT:		
PACKAGE: SELF CLEANING STRAINER (SCS)		
1. The bidder should have designed, manufactured, tested, inspected & supplied the SCS with minimum flow of 2700 CubM/hr which have been successfully in use for at least 1 year in thermal power plant or similar industry/ application and bidder is in business of SCS on continuous basis. Bidder to comply to general points of PQR available at http://bhelpem.com/vensection/PMD/PMD.aspx . In case bidder is not OEM, the offer shall be evaluated as per point no 1 of general points of PQR		
2. The Bidders shall furnish following support documents for assessment of Bidder w.r.t. PQR as indicated at Sl. No. 1 above: A. Bidder's Experience list of SCS for last 5 years for assessment of bidder for supplying the SCS on regular basis in enclosed format- Annexure-1. Bidder shall furnish the PO copy/approved documents/ Dispatch details of at least one executed Contract as indicated in the experience list. B. Bidder shall furnish any one from below in support of successful performance of SCS for one year: i. Satisfactory Performance feedback certificates from End Customer (Owner) (in English) for at least one successfully executed contract which has been in use for atleast One year indicating salient features like year of commissioning of SCS, rating of project, Size, Flow, project name etc., date of issue of certificate and name/ designation of the certificate issuer for power plant/similar application industry. OR ii. The bidder has been awarded One repeat contract for SCS from End Customer (Owner) / Purchaser (in English) for power plant/similar application industry. Repeat contract shall be considered when the second contract is given by the same purchaser/ owner after lapse of minimum 1 year from execution of first contract. Supporting documents for execution of the Contract like dispatch details, MDCC, Inspection report etc. along with the PO Copy to be furnished, if bidder intends to submit the documents for Repeat Contracts. OR iii. In case, bidder has executed contract(s) for BHEL-PEM, internal assessment by BHEL-PEM shall be followed for evaluation for satisfactory performance. For this, bidder to submit the request along-with relevant documents. Note:- Purchase order copy, approved drgs/technical data sheets etc. are to be submitted along with the bid for which the bidder intends to furnish the performance feedbacks / repeat contracts for reference purpose only.		

EXPERIENCE LIST**EQUIPMENT :** SELF CLEANING STRAINER**Vendor :**

SL. NO.	PROJECT	CUSTOMER/ CONSULTANTS	YEAR OF SUPPLY OF SCS	SIZE (MM)	CAPACITY (Cub. M/ Hr)	QTY	MATERIAL OF CONSTRUCTION (Housing/Strainer Element)	QUALITY OF WATER HANDLED	Performance feedback certificate from end user (enclosed/not enclosed)	

COMPANY SEAL

**TECHNICAL SPECIFICATION
FOR RATE CONTRACT
SELF CLEANING STRAINERS (SCS).**

Specification No. : PE-TS- RC-165-N004 Rev 00



**BHARAT HEAVY ELECTRICALS LIMITED
POWER SECTOR
PROJECT ENGINEERING MANAGEMENT
PPEI BLDG., SEC-16A, PLOT NO. 25
NOIDA – 201301 (UP)**



TITLE:
**TECHNICAL SPECIFICATION
OF RATE CONTRACT
SELF CELAING STRAINER**

SPECIFIC TECHNICAL REQUIREMENTS

SPEC. NO.: **PE-TS-RC-165-N004**

SECTION:

SUB-SECTION:

REV. NO. 0 DATE 24.03.2017

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INDEX

THIS TECHNICAL SPECIFICATION CONSISTS OF FOLLOWING SECTIONS:

CONTENTS

SECTION	TITLE
I	Specific Technical Requirements
IA	Specific Technical Requirements (Mechanical)
IB	Specific Technical Requirements (Elec.)
IC	Specific Technical Requirements (C&I)
ID	Data Sheet – A
II	Standard Technical Specifications
IIA	Standard Technical Specifications (Mechanical)
IIB	Standard Technical Specifications (Elec.)
IIC	Standard Technical Specifications (C&I.)
III	Documents to be submitted by Bidder
IIIA	Guarantee Schedule (To be submitted along with the Bid by all Bidders)
IIIB	Compliance Certificate (To be submitted along with the Bid by all Bidders)
IIIC	Data Sheet – B (To be submitted by successful Bidder after award of Contract)



TITLE:

**TECHNICAL SPECIFICATION
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SELF CELAING STRAINER**

SPECIFIC TECHNICAL REQUIREMENTS

SPEC. NO.: **PE-TS-RC--165-N004**

SECTION: I

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SECTION - I

SPECIFIC TECHNICAL REQUIREMENTS

- SUB-SECTION IA** - Specific Technical Requirements (Mech.)
- SUB-SECTION IB** - Specific Technical Requirements (Electrical)
- SUB-SECTION IC** - Specific Technical Requirements (C & I)
- SUB-SECTION ID** – Datasheet-A



TITLE:

**TECHNICAL SPECIFICATION
OF RATE CONTRACT
SELF CLEANING STRAINER**

SPECIFIC TECHNICAL REQUIREMENTS

SPEC. NO.: **PE-TS-RC-165-N004**

SECTION: **I**

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SUB-SECTION – IA

SPECIFIC TECHNICAL REQUIREMENTS (MECHANICAL)



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**TECHNICAL SPECIFICATION
OF RATE CONTRACT
SELF CLEANING STRAINER****SPECIFIC TECHNICAL REQUIREMENTS**SPEC. NO.: **PE-TS-RC-165-N004**SECTION: **I**SUB-SECTION: **IA**REV. NO. **0** DATE **24.03.2017**SHEET **1** OF **8****1.0 GENERAL**

- 1.1 This specification is intended for finalization of rate contract between BHEL PEM and Bidder. Standard technical detail as indicated in the specification shall be agreed upon between BHEL PEM and Bidder. Project specific technical detail shall be made available to the bidder along with project enquiry.
- 1.2 This enquiry covers the design, manufacture, assembly, inspection and testing at manufacturer's and/or his sub-contractors works, proper packing for delivery installation checks, commissioning, Trail run and PG test for Self-Cleaning Strainer with mandatory spares complete with all accessories as per the requirements specified in this specification.

The Self Cleaning Strainer (SCS) complete with all accessories shall conform to the standard technical specifications (Section-II) and Data Sheet-A enclosed herewith. In addition the requirements of this section I including customer specification attached (as applicable) shall also be complied with. However, wherever the details given in Section-II and Data Sheet-A are different, the requirements of Data Sheet-A shall prevail. Similarly in the event of contradictions between Section-I/ customer specification (Annexure-IV) / Section-II/ Data Sheet-A, the same shall prevail in the order as: customer specification, Section-I, Datasheet-A, Section-II.

Section I consists of 4 Sub-Sections viz. Sub-Sec. IA, IB and IC for Mechanical, Electrical and C&I respectively and Sub-Section ID for Datasheet-A, the requirements of all 4 sub-sections shall be complied with.

NOTE :- The specification is made with the intent of entering Rate Contract for the Supply, Commissioning, Trail run and PG test of Self Cleaning Strainer for various projects time to time.

List of Self Cleaning Strainer for various water Application:

- a) For clarified water Application:
- i) TYPE-I Flow= 2100-2300 CubM/hr Size= 600 NB
 - ii) TYPE-II Flow= 2400-2600 CubM/hr Size= 600 NB
- b) For Sea water Application:
- i) TYPE-III Flow= 3100-3400 CubM/hr Size= 700 NB
 - ii) TYPE- IV Flow= 4200-4500 CubM/hr Size= 800 NB
 - iii) TYPE-V Flow= 3500-4100 CubM/hr Size= 800 NB

Bidder to note that flow of SCS for various sizes may vary during detail engineering up to (+/-) 5%. Same shall be informed during project specific order. However maximum possible design parameter are indicated in the respective datasheet of each type in Section- ID of this specification. No commercial implication shall be applicable for the same.

- 1.3 The omission/ addition of specific reference to any component / accessory necessary for the proper performance of the equipment's shall not relieve the supplier of the responsibility of providing such facilities to complete the supply within the quoted prices.
- 1.4 The bids shall be evaluated as per NIT. Ordering shall be done separately for each project.



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- 1.5 Bidder to quote for items as per price schedule attached in NIT. The quantity as mentioned in the BOQ is only for evaluation purpose. However actual ordered quantity may vary from project to project throughout the year.

2.0 DESCRIPTION OF EQUIPMENTS :**SELF CLEANING STRAINER (SCS).**

The Self Cleaning Strainer (SCS) is intended to prevent accumulation of debris in ACW Pipeline. The water through the self cleaning strainers outlet shall be supplied to the Secondary side of Plate Heat Exchangers. The water analysis is indicated with Datasheet-A.

3.0 SCOPE OF SUPPLY UNDER THE SPECIFICATION IN THE BIDDER'S SCOPE FOR SELF CLEANING STRAINER (SCS).

- 3.1 The details of SCS with quantities, design parameters, size and MOC's as per Data Sheet-A.

3.2 SCOPE OF SUPPLY IN THE BIDDER'S SCOPE FOR SELF CLEANING STRAINER:

- 3.2.1 Each set of SCS shall comprise as following:

a) Flushing pump with drive Motor (if required) - 1 No.

b) For Calrified Water :- Supply of complete interconnecting pipe (as applicable) and debris disposal pipe work including flanges/counter flanges, bends, fittings, supports, gaskets, fasteners etc. shall be in scope of Bidder. However bidder is to consider debris disposal pipe length and no. of bends as per the list of BOQ mentioned in Data-Sheet A to this Section. In case actual piping comes out to be less than the BOQ of Data sheet A, still bidder has to supply the same as minimum requirement. Bidder shall finalize the pipework to suit the layout at contract stage in such a way that minimum site welding is required for pipework by purchaser at site.

For Sea water :- Complete Interconnecting (As Applicable) & Debris disposal Pipe work, including flanges/counter flanges for pipes, bends, fittings, distributors, nozzles and support Installation materials shall be in Purchaser's scope. **However, valves along with its Flanges/Counter Flanges/Gaskets/Nuts & Bolts shall be in Bidder's Scope.** Isometric Drawing along with BOM for interconnection piping, flanges/counter flanges for pipes, bends, fittings, distributors, nozzles and support installation materials in line with approved Installation Drawing to be submitted by the Bidder within 4 weeks after approval of the Installation Plan. Minimum Pipe Size to be considered by the Bidder for all interconnecting (as applicable) & Debris disposal piping shall be 200 Nb.

c) Filter body/ housing Vent and drain connections along with their isolating valves.

d) Length of Self Cleaning Strainer, complete with bolts, nuts and gaskets shall be as per Data sheet-A. Thickness of body flange shall be as per BS 4504/ equivalent standard.

e) Differential pressure measuring system for Self-Cleaning Strainer. DP measuring system shall comprise of 2 Nos. DPT + 1 No. DPG for each SCS and shall be with



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Remote seal arrangement. Stubs for DPT and DPG shall be independent.

- f) The Electrical & C&I items/ accessories as specified in succeeding clause/ respective sections herein.
- g) Starter Panel (Switch Gear Panel) shall be as follows:
- (i) 2 Sets of Self Cleaning Strainer shall have one Common Starter Panel (Switch Gear Panel) for DCS based control system.

Switch Gear Panel should have suitable arrangement like Bus Coupler for providing redundancy to incoming supply feeder (1Working + 1 Standby feeder).

- h) Power and Control cables between Starter Panel and various drives in bidder's scope of supply. Refer note at electrical scope between BHEL and Vendor in section IB.
- i) All the field instruments stipulated in this specification shall be in Bidder's scope.
- j) Set of commissioning spares, on "As required basis".
- k) Set of mandatory spares as indicated in Data Sheet A.
- l) Supporting arrangement complete with saddle support, foundation plates, anchor bolts, nuts, sleeves, inserts, all installation materials, fixing bolts, clamps and other accessories etc. for complete equipment supplied under this package
- m) Finish paints for touch up painting of equipment after erection at site, in sealed containers.
- n) Set of special tools and tackles if required for maintenance and erection of the equipment supplied.
- o) Various drawings, data test reports/ certificates instruction manuals for erection operation and maintenance etc. as specified in Data Sheet-C and cables schedule indicating BOQ for power & control cables.
- p) Panels & Instruments: Scope and Type as specified in C&I section wherever required.

Any item not specified but required to make SCS complete package shall also be in bidder's scope.

4.0 SCOPE OF SERVICES INCLUDED IN THE BIDDER'S SCOPE :

The bidder's scope also includes following services at site, for scope under this specification for Self-Cleaning Strainer:

- a) Installation checks (Erection in BHEL's scope).
- b) Commissioning of equipment.
- c) Trial run for requisite period
- d) Performance Guarantee Testing.



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The trial run & PG Test of equipment shall be generally conducted immediately after commissioning. These activities for different units shall be timed separately.

- **For drawings/documents approval**

In the event of order all drawings / documents in soft as well as hard copy shall be submitted as per Cl. No. 10.0.

Further on receipt of Customer comments, if required bidder's engineer shall visit BHEL/ Customer along with soft copy to resolve all issues and incorporate comments in the soft copy for across the table finalization and Category-I approval.

- **Site Visits for installation check / commissioning/ trial run/PG Test:**

Bidder to include cost of two site visits for four days each for installation check, commissioning, trial run and PG testing.

In case of non-completion of above activities in site visits stipulated above, for any reasons not attributable to vendor, vendor shall complete above activities in subsequent site visits for which cost shall be borne by BHEL on pro-rata basis on price of site visit quoted by bidder in price schedule.

5.0 EXCLUSIONS :

The following are excluded from the bidder's scope.

5.1 Civil foundation works required for installation

5.2 Erection of Equipment at site.

6.0 DESIGN CONSTRUCTION :

In addition to the requirements of Section-IIA the following shall also be complied.

6.1 Layout Piping Arrangement Drg. is enclosed in the specifications at Annexure-III of Datasheet-A.

6.2 Thickness of body flange and counter flange of SCS shall be as per BS 4504/ equivalent standard.

6.3 The materials of construction specified in Data Sheet-A are minimum requirements and materials of construction for other components not specified shall be similarly selected by the bidder for the intended duty which shall be subject to purchaser's approval during detailed engineering in the event of order.

6.4 Housing/ body of SCS shall be designed and manufactured as per the applicable codes for pressure vessels and to take care of force and moments as enclosed in the specification. However in no case thickness of housing/ body shall be less than connecting pipe thickness as specified in Data Sheet-A of Self Cleaning Strainer.

6.5 Adequate provision for future installation of Cathodic Protection for Self-Cleaning Strainer (Sacrificial type) shall be kept by the bidder in the equipment.



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- 6.6** Velocity in the pipe work shall be less than 1.5 m/ sec for pump suction and less than 2.0 m/ sec. in other pipe work. All valves upto 150 NB shall be ball valves. For higher sizes, gate/ globe/ B.F. valves shall be provided. All instrument valves shall be needle valves.

7.0 Performance Guarantee for SCS.

Performance Guarantee Parameters shall be as under:

- Max. Pressure drop in Self-Cleaning Strainer in clean condition (Test to be conducted along with commissioning) – not exceeding 1.0 MWC. The Bids shall be technically rejected for pressure drop quoted higher than 1.0 MWC.

Any deviation to above pressure drop will not be accepted.

In case the successful bidder fails to demonstrate above parameter, he shall carry out modifications at his own cost, to purchaser's approval.

In case bidder fails to demonstrate above parameter to purchaser's satisfaction even after modification carried by him at site, the purchaser has the right to reject the equipment outrightly and bidder is liable to resupply the equipment meeting the contractual performance parameters within time period mutually agreed upon without any cost implication to BHEL/Customer.

8.0 SPARES :

8.1 Mandatory Spares

Mandatory Spares shall be as per Data Sheet-A or annexure enclosed with data sheet A.

9.0 Quality Plan

Bidder shall submit QP in the event of order based on the guidelines given in the specification & QP enclosed therein. QP will be subject to BHEL/ Customer approval and customer hold points for inspection/ testing shall be marked in the QP at the contract stage. Inspection/ testing shall be witnessed as per same apart from review of various test certificates/ Inspection records etc. Charges for 3rd party inspection (TUV/ equivalent) for imported components wherever required shall be included by bidder in the base price itself. If BHEL or BHEL customer decides to witness the tests along with third party, the cost of travel of BHEL or BHEL customer shall be borne by BHEL or BHEL customer themselves.

10.0 DELIVERY & DRAWINGS/ DOCUMENTS DISTRIBUTION SCHEDULE :

a. Delivery of Equipment shall be as per NIT.

b. The drawings to be submitted by bidder in event of award of contract:

- Technical Data Sheets, P&ID, Installation Plan.
- GA drawings, Details of Flushing Skid (if any) and C& I Document (Part-I & II) of SCS as applicable.
- Quality Plan.
- O & M Manual.



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c. Drawings submission schedule after the award of contract shall be as below:

PACKAGE	BHEL DRG NO	DRG TITLE	Drg Sch for Vendors
SELF CLEAING STRAINER	Primary Documents:		
	PE-V4- XXX-165-N001	P&ID - OF SCS SYSTEM	R-0 within 20 days (for all except Installation plan, for Installation Plan 30 Days) from LOI/PO & subsequent revisions within 10 days of comments received from BHEL.
	PE-V4- XXX-165-N002	TECHNICAL DATA SHEET-SCS	
	PE-V4- XXX-165-N003	INSTALLATION PLAN- SCS	
	PE-V4- XXX-165-N004	GENERAL ARRANGEMENT OF SCS	
	PE-V4- XXX-165-N006	C&I Part-I, PANEL-TDS, I/O LIST, CABLE SCH AND CONTROL PHILOSPHY FOR SCS	
	PE-V4- XXX-165-N008	QP- SCS	
	PE-V4- XXX-165-N005	GA OF FLUSHING PUMP & FOUNDATION DETAILS OF FLUSHING PUMP AND SADDLE SUPPORT (If Applicable)	R-0 within 10 days from Cat-I(or)II approval of TDS & subsequent revisions within 10 days of comments received from BHEL.
	Secondary Documents:		
	PE-V4- XX -165-N007	GA & WIRING DIAGRAM OF PANEL- SCS	R-0 within 30 days from Cat-I(or)II approval of C&I Part-I document & subsequent revisions within 10 days of comments received from BHEL
	PE-V4- XXX-165-N009	O&M MANUAL-SCS	Within 30 days from MDCC

- 11.0** The makes of various bought out items shall be subjected to approval of Customer/ BHEL in the event of order.
- 12.0** It is mandatory for the bidders to submit along with the bid the deviations if any whether major or minor in the schedule of deviations only. ***In the absence of deviations listed in the schedule of deviations the offer shall be deemed to be in full conformity with the specification "non-withstanding" anything else stated elsewhere in bidder's offer, data sheets etc. The implied/ indirect deviations in data sheets etc. Shall not be binding on the purchaser.***



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13.0 The following documents shall be furnished by the bidder with his offer :

- Compliance certificate duly signed and stamped (Enclosed at Section III).
- Guarantee schedule duly signed and stamped (Enclosed at Section III).
- GA drawings of following with empty/ filled-ups.
 - SCS body/ housing (as applicable).
 - Flushing Skid (if any).
 - Other equipment considered necessary for Layout/ Civil.
- Electrical Load Data (Enclosed at Section III).
- Schedule of Deviation (Enclosed in NIT).

The bidder to note that load requirement furnished and finalized during tender stage shall only be provided by BHEL and any changes or additional requirement of Electrical load by bidder during contract stage shall be provided by BHEL with cost repercussions to the bidder.

NOTE: Apart from above, no other drawing/ document/ data sheet etc. shall be submitted along with the offer. If any drawing/ document etc. is submitted with the offer, same shall be considered as for 'Reference' purpose only and shall not be reviewed/ commented upon and any deviation, exclusion to scope, etc. taken in documents but not highlighted in the deviation schedule shall not be taken cognizance of.

14.0 Self-Cleaning Strainer packing procedure before dispatch

The purpose of this procedure is to outline the requirements and procedures for protecting the equipment's during shipment and preserving during the storage.

14.1 Preparation for Packing:

- After hydro testing, operation, all fluids e.g. water etc., shall be completely drained from all SCS's parts, and the equipment blown dry.
- All material shall be cleaned internally and externally to remove, scale, rust fillings and any other foreign material.
- The SCS shall be placed on a strong wooden base & bolted to the wooden base using the foundation holes for further transportation up to site.

14.2 Protection of parts:

- SCS Shell shall be packed in properly in high grade bubble plastic wrap for transportation, and long storage at site.
- Actuators shall be packed in separate wooden box of proper sizes.
- SCS items (EXCEPT SCS Shell) shall be packed in proper sizes of wooden cases. High grade woods like Rubber woods, jungle wood, hard wood, mango wood, pine wood, etc. is used for packing.



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- Loose material, & Electrical & Electronics items shall be packed in corrugated box and plastic bags with proper tagging and marking of handle with care in proper sizes of wooden cases
- All finished (or) machined (External C.S. Surfaces shall be protected against corrosion with corrosion resisting coating, which is easily removable (Compound shall be such that it will remain on the surface at temperature normally encountered during shipping & storage).
- All machined surfaces shall be protected from mechanical damage. All external unfinished carbon steel surfaces shall be sand blasted & shall be coated with rust preventive primer.
- Flanged opening if any shall be covered with blank flanges sealed with blank gasket of natural rubber or equivalent. Butt welded opening shall be closed with temporary closing covers. Internal threads shall be protected with metal plug sealed with Teflon tape (if applicable). External thread shall be protected with PVC sleeve.
- Wooden cases shall be covered with HDPE cloth from inside wooden box and the top. All the opening in plate heat exchanger shall be closed properly by suitably covering to prevent foreign material entering in plate heat exchanger.
- All fabricated wooden cases & crates conform to the requirement as per table given below:

Gross Weight [Kgs.]	Board Thickness	Batton / Rafter Thickness
2000 to 9000	Min. 30 mm	Min. 35 mm
9000 to 18000	Min. 50 mm	Min. 35 mm

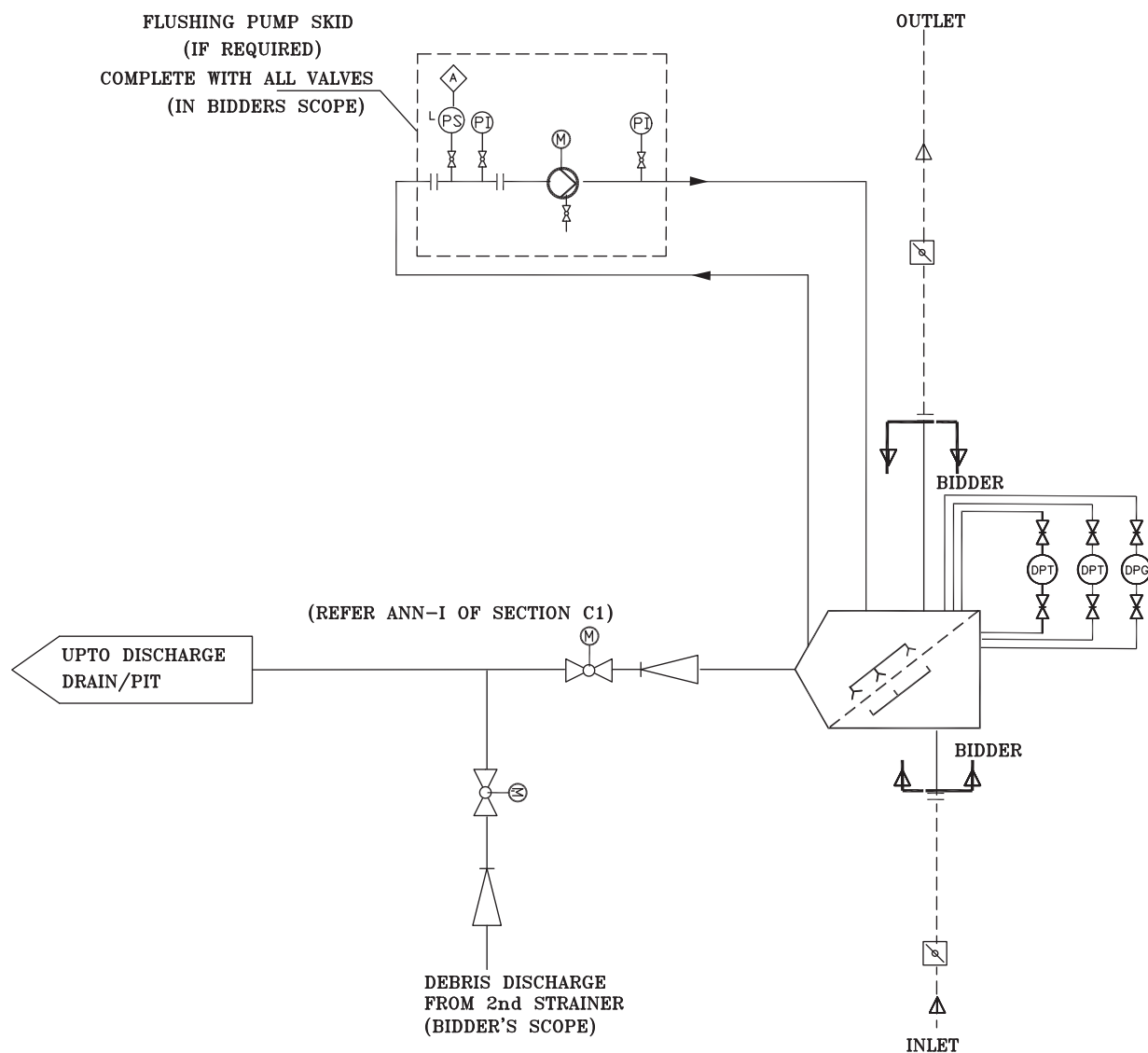
- All the equipment shall be protected for entire period of dispatch, storage and erection against corrosion, incidental damage due to vermin, sunlight, rain, high temperature, humid atmosphere, rough handling in transit and storage. All MS parts which are not painted shall be provided with coating of grease.
- Clay Desiccant or such other moisture absorbing material in small cotton bags shall be placed and tied at various points on the equipment, wherever necessary.

14.3 Preservation

The equipment's shall be stored under closed/open space in packed condition until installation. The packages containing loose plates and gaskets are to be protected from extreme climatic conditions.

14.4 Photographs

- 14.5** Bidder to take photographs of all parts like SCS Shell, Screen, pumps (if any), piping, valves, instruments, actuators, panel (inside & outside) and sent to engineering deptt along with all inspection reports before final dispatch.



NOTE :-

1. SCHEMATIC SHOWN IS TYPICAL FOR ONE SCS, SHALL BE IDENTICAL FOR THE SECOND SCS.
2. INSTRUMENTS/ANNUNCIATIONS/ INTERLOCKS INDICATED IN THE SCHEME ARE TENTATIVE, SHALL BE PROVIDED AS PER APPROVED DRGS./ DOCUMENTS/ CONTROL PHILOSOPHY IN THE EVENT OF ORDER.
3. COUNTERFLANGES FOR SCS ARE INCLUDED IN BIDDERS SCOPE. ALL INTERCONNECTING / DEBRIS DISPOSAL PIPING IS INCLUDED IN BIDDERS SCOPE.
4. BIDDER'S SCOPE OF SUPPLY ALSO INCLUDES :
 - a) ALL VALVES & NRVs ON BIDDER'S INTERCONNECTING /DEBRIS DISPOSAL PIPING ALONGWITH THEIR COUNTER FLANGES.
 - b) FLUSHING PUMP SKID, IF REQUIRED COMPLETE WITH FLUSHING PUMP, VALVES, INSTRUMENTS ETC.
5. PURCHASER I BIDDER'S SCOPE OF SUPPLY

FLOW DIAGRAM FOR
SELF CLEANING STRAINER



TITLE:

**TECHNICAL SPECIFICATION
OF RATE CONTRACT
SELF CLEANING STRAINER**

SPECIFIC TECHNICAL REQUIREMENTS

SPEC. NO.: **PE-TS-RC-165-N004**

SECTION: **I**

SUB-SECTION: **IB**

REV. NO. **0** DATE **24.03.2017**

SHEET **1** OF **1**

SUB-SECTION – IB

SPECIFIC TECHNICAL REQUIREMENTS (ELECTRICAL)



**ELECTRICAL EQUIPMENT SPECIFICATION
FOR
SELF CLEANING STRAINERS**

SPECIFICATION NO.

VOLUME NO. : **II-B**

SECTION : **C**

REV NO. : **00** DATE : 30/03/17

SHEET : 1 OF 3

**TECHNICAL SPECIFICATION FOR
SELF CLEANING STRAINERS
(ELECTRICAL PORTION)**



**ELECTRICAL EQUIPMENT SPECIFICATION
FOR
SELF CLEANING STRAINERS**

SPECIFICATION NO.

VOLUME NO. : II-B

SECTION : C

REV NO. : 00 DATE : 30/03/17

SHEET : 2 OF 3

1.0 EQUIPMENT & SERVICES TO BE PROVIDED BY BIDDER:

- a) Services and equipment as per “Electrical Scope between BHEL and Vendor”.
- b) Any item/work either supply of equipment or erection material which have not been specifically mentioned but are necessary to complete the work for trouble free and efficient operation of the plant shall be deemed to be included within the scope of this specification. The same shall be provided by the bidder without any extra charge.
- c) Supply of mandatory spares as specified in the specifications of mechanical equipments.
- d) Electrical load requirement for SELF CLEANING STRAINERS.
- e) All equipment shall be suitable for the power supply fault levels and other climatic conditions mentioned in the enclosed project information.
- f) Bidder to furnish list of makes for each equipment at contract stage, which shall be subject to customer/BHEL approval without any commercial and delivery implications to BHEL
- g) Various drawings, data sheets as per required format, Quality plans, calculations, test reports, test certificates, operation and maintenance manuals etc shall be furnished as specified at contract stage. All documents shall be subject to customer/BHEL approval without any commercial implication to BHEL.
- h) Motor shall meet the general technical requirements for motor.
- i) Vendor to clearly indicate equipment locations and local routing lengths in their cable listing furnished to BHEL.
- j) Cable BOQ worked out based on routing of cable listing provided by the vendor for “ both end equipment in vendor’s scope”shall be binding to the vendor with +10 % margin to take care of slight variation in routing length & wastages.

**2.0 EQUIPMENT & SERVICES TO BE PROVIDED BY PURCHASER FOR
ELECTRICAL & TERMINAL POINTS:**

Refer “Electrical Scope between BHEL and Vendor”.

3.0 DOCUMENTS TO BE SUBMITTED ALONG WITH BID

- 3.1 The electrical specification without any deviation from the technical/quality assurance requirements stipulated shall be deemed to be complied by the bidder in case bidder furnishes the overall compliance of package technical specification in the form of compliance certificate/No deviation certificate.



**ELECTRICAL EQUIPMENT SPECIFICATION
FOR
SELF CLEANING STRAINERS**

SPECIFICATION NO.

VOLUME NO. : **II-B**

SECTION : **C**

REV NO. : **00** DATE : 30/03/17

SHEET : 3 OF 3

3.2 No technical submittal such as copies of data sheets, drawings, write-up, quality plans, type test certificates, technical literature, etc, is required during tender stage. Any such submission even if made, shall not be considered as part of offer.

4.0 List of enclosures :

- a) Electrical scope between BHEL & vendor (Annexure –I)
- b) General technical requirements for LV motors.
- c) Datasheet A & C.
- d) Quality plan for motors.
- e) Electrical Load data format (Annexure –II)
- f) BHEL cable listing format (Annexure –III)

STANDARD ELECTRICAL SCOPE BETWEEN BHEL AND VENDOR (FOR EPC PROJECTS)**PACKAGES: SCS****SCOPE OF VENDOR: SUPPLY****PROJECT:**

S.NO	DETAILS	SCOPE SUPPLY	SCOPE E&C	REMARKS
1	415V MCC Starter cum control panel (if applicable)	BHEL Vendor	BHEL BHEL	415 V AC, 3 phase, 3 wire supply shall be provided by BHEL based on load data provided by vendor at contract stage for all equipment supplied by vendor as part of contract. Any other voltage level (AC/DC) required will be derived by the vendor.
2	Local Push Button Station (for motors)	BHEL	BHEL	Located near the motor.
3	Power cables, control cables and screened control cables for a) both end equipment in BHEL's scope b) both end equipment in vendor's scope c) one end equipment in vendor's scope	BHEL Vendor BHEL	BHEL BHEL BHEL	1. For 3.b) & c): Sizes of cables required shall be informed by vendor at contract stage (based on inputs provided by BHEL) in the form of cable listing. Finalisation of cable sizes shall be done by BHEL. Vendor shall provide lugs & glands accordingly. 2. Cabling/ termination by BHEL.
4	Junction box for control & instrumentation cable	Vendor	BHEL	Number of Junction Boxes shall be sufficient and positioned in the field to minimize local cabling (max 10-12 mtrs) and trunk cable.
5	Any special type of cable like compensating, co-axial, prefab, MICC, fibre optical etc.	Vendor	BHEL	Refer scope/ C&I portion of specification for scope of fibre Optical cables if used between PLC/ micro processor & DCS.
6	Cable trays, accessories & cable trays supporting system	BHEL	BHEL	
7	Cable glands and lugs for equipment supplied by Vendor	Vendor	BHEL	1. Double compression Ni-Cr plated brass cable glands 2. Solder less crimping type heavy duty copper lugs for power & control cables.
8	Conduit and conduit accessories for cabling between equipment supplied by vendor	Vendor	BHEL	Conduits shall be medium duty, hot dip galvanised cold rolled mild steel rigid conduit as per IS: 9537.
9	Lighting	BHEL	BHEL	
10	Equipment grounding & lightning protection	BHEL	BHEL	

STANDARD ELECTRICAL SCOPE BETWEEN BHEL AND VENDOR (FOR EPC PROJECTS)**PACKAGES: SCS****SCOPE OF VENDOR: SUPPLY****PROJECT:**

S.NO	DETAILS	SCOPE SUPPLY	SCOPE E&C	REMARKS
11	Below grade grounding	BHEL	BHEL	
12	LT Motors with base plate and foundation hardware	Vendor	BHEL	Makes shall be subject to customer/ BHEL approval at contract stage.
13	Mandatory spares	Vendor	-	Vendor to quote as per specification.
14	Recommended O & M spares	Vendor	-	As specified elsewhere in specification
15	Any other equipment/ material/ service required for completeness of system based on system offered by the vendor (to ensure trouble free and efficient operation of the system).	Vendor	BHEL	
16	a) Input cable schedules (Control & Screened Control Cables) b) Cable interconnection details for above c) Cable block diagram	Vendor Vendor Vendor	- - -	Cable listing for Control and Instrumentation Cable in enclosed excel format shall be submitted by vendor during detailed engineering stage.
17	Equipment layout drawings	Vendor	-	For preparation of cabling layout drawings by BHEL, vendor shall furnish Electrical equipment layout drawings (both in print form as well as in AUTOCAD) of the complete plant (including electrical area) indicating location and identification of all equipment requiring cabling,
18	Electrical Equipment GA drawing	Vendor	-	For necessary interface review.

NOTES:

1. Make of all electrical equipment/ items supplied shall be reputed make & shall be subject to approval of BHEL/customer after award of contract.
2. All QPs shall be subject to approval of BHEL/customer after award of contract without any commercial implication.
3. In case the requirement of Junction Box arises on account of Power Cable size mis-match due to vendor engineering at later stage, vendor shall supply the Junction Box for suitable termination.

SL.NO.	PARAMETERS	SPECFIIC TECHNICAL REQUIREMENTS OF ELECTRICAL MOTOR				SPEC NO- PE-TS- 405-165-N004.
		TYPE-I	TYPE-II	TYPE-III	TYPE-IV	TYPE-V
1	CODE ANS STANDARDS	IS-325, IS-12615, IEC-60034	IS-325, IS-12615, IEC-60034	IS-325, IS-12615, IEC-60034, IS-4691, IS-4728	IS-325, IS-12615, IEC-60034	IS:325, IEC:60034,IS:996, IEC:60034,IS:3177, IEC:60034,IS:4722,IS: 4691 , IS: 4728, IS: 6362, IS: 2253,IS: 12065,IS 12075
2	SERVICE CONDITIONS	Hot, Humid and Tropical Atmosphere	Hot, Humid and Tropical Atmosphere highly polluted.	Hot, Humid and Tropical Atmosphere highly polluted.	Hot, Humid and Tropical Atmosphere	Hot, Humid and Tropical Atmosphere highly polluted.
3	TYPE AND RATING	General purpose, Constant speed, Squirrel cage, Three/Single phase, Induction type, Continuous duty, motor name-plate rating at 50°C shall have at least 10% margin	General purpose, Constant speed, Squirrel cage, Three/Single phase, Induction type, Continuous duty, motor name-plate rating at 50°C shall have at least 15% margin	General purpose, Constant speed, Squirrel cage, Three/Single phase, Induction type, Continuous duty, motor name plate rating at 50°C shall have more than 10% margin over the input power requirement of the HT driven equipment and 15% for LT driven equipments at rated duty point.	General purpose, Constant speed, Squirrel cage, Three/Single phase, Induction type, Continuous duty, motor name-plate rating at 50°C shall have at least 10% margin	General purpose, Constant speed, Squirrel cage, Three/Single phase, Induction type, Continuous duty, motor name-plate rating at 50°C, relative humidity of 95% and shall have at least 15% margin. All LV motors above 10 kW with S1 duty.
4	EFFICIENCY CLASS	IE3	IE3 (As per latest BIS notification)	IE3	IE3	IE3
5	RUNNING REQUIREMENT	(a) Motors shall run satisfactorily at a supply voltage of 75% of rated voltage for 5 minutes with full load without injurious heating to the motor.	(a) Motor shall run continuously at rated output over the entire range of 415V±10% voltage and 50Hz+3% to -5% frequency variations.	(a) The motor shall be capable of operating satisfactorily at full load for 5 minutes without injurious heating with 75% rated voltage at motor terminals. (b) Motor shall not stall if the supply voltage drops to 70% of the rated voltage two (2) second duration. (c) The motor shall be designed to withstand momentary overload of 60% of full load torque for 15 second without any damage.	(a) Motors shall run satisfactorily at a supply voltage of 80% of rated voltage for 5 minutes with full load without injurious heating to the motor. (b) Motor shall run continuously at rated output over the entire range of voltage and frequency variations as required for the driven equipment	(a) Motors shall run satisfactorily at a supply voltage of 75% of rated voltage for 5 minutes with full load without injurious heating to the motor. (b) Motor shall not stall due to voltage dip in the system causing momentary drop in voltage upto 70% of the rated voltage for duration of 2 secs.
		(b) Motor shall run continuously at rated output over the entire range of voltage and frequency variations as required for the driven equipment	(b) The motor shall be capable of operating satisfactorily at full load for 5 minutes without injurious heating with 75% rated voltage at motor terminals.			
			(c) The motor shall be designed to withstand momentary overload of 60% of full load torque for 15 second without any damage.			
6	STARTING CURRENT	(a) 720% incl. of tolerance as per IS: 325 (b) The motor shall be capable of withstanding the stresses imposed if started at 110% rated voltage. (c) Motors shall be capable of starting and accelerating the load with direct on line starting without exceeding acceptable winding temperature. (d) Pump motor subject to reverse rotation shall be designed to withstand the stresses encountered when starting with non-energized shaft rotating at 125% rated speed in reverse direction (e) The following frequency of starts shall apply i) Three equally spaced starts in an hour the motor being initially at a temperature not exceeding the rated load operating temperature. ii) The motor shall be capable of two starts in succession with coasting to rest between starts and the motor initially at rated operating temperature. iii) Two hot starts in succession with the motor being initially at a temperature not exceeding the rated load temperature.	(a) Motor shall be designed for direct online starting at full voltage. Breakaway starting current as percentage of full load current for various motor rating shall not exceed 600% subject to IS tolerance of plus 20%. (b) The motor shall be capable of withstanding the stresses imposed if started at 110% rated voltage. (c) Motor shall start with rated load and accelerate to full speed with 80% rated voltage at motor terminals. (d) Two hot starts in succession with motor initially at normal running temperature. (e) The motors shall be designed to withstand 120% of rated speed for 2 minutes without any mechanical damage.	(a) Starting current shall not exceed 6 times full load current for all auxiliaries. No further tolerances are applicable on starting current specified above for HT motors. (b) For LT motors, the applicable starting current shall be limited to 7.2 times of full load current including all tolerance. (b) The motor shall be capable of withstanding the stresses imposed if started at 110% rated voltage. (c) Motor with rigid coupling shall start with rated load and accelerate to full speed with 80% rated voltage at motor terminals. (d) Minimum starting requirement for fluid coupling shall be 75% rated voltage at motor terminals. (i) Motor shall be capable of three equally spread starts per hour, two starts in quick succession from cold condition and one restart from hot condition. (ii) Pump motor subject to reverse rotation shall be designed to withstand the stresses encountered when starting with shaft rotating at 125% rated speed in reverse direction. (c) The motors shall be designed to withstand 120% of rated speed for 2 minutes without any mechanical damage.	(a) For LT motors (except energy efficient motors) locked rotor current shall not exceed 700% of full load current inclusive of tolerance as per IS: 325. For LT energy efficient motors above 10kW with S1 duty, locked rotor current shall be as per IS: 12615-2011. (b) The motor shall be capable of withstanding the stresses imposed if started at 110% rated voltage. (c) Motors shall be capable of starting and accelerating the load with direct on line starting without exceeding acceptable winding temperature. (d) Pump motor subject to reverse rotation shall be designed to withstand the stresses encountered when starting with non-energized shaft rotating at 125% rated speed in reverse direction (e) The following frequency of starts shall apply i) Three equally spaced starts in an hour the motor being initially at a temperature not exceeding the rated load operating temperature. ii) The motor shall be capable of two starts in succession with coasting to rest between starts and the motor initially at rated operating temperature. iii) Two hot starts in succession with the motor being initially at a temperature not exceeding the rated load temperature.	(a) Locked rotor current shall not exceed 600% of full load current inclusive of IS tolerance. (b) The motor shall be capable of withstanding the stresses imposed if started at 110% rated voltage. (c) Motor shall start with rated load and accelerate to full speed with 80% rated voltage at motor terminals. (d) Two hot starts in succession with motor initially at normal running temperature. (e) Pump motor subject to reverse rotation shall be designed to withstand the stresses encountered when starting with shaft rotating at 125% rated speed in reverse direction. (f)Accelerating torque at any speed with the lowest permissible starting voltage shall be at least 10% motor full load torque. (g). Pull out torque at rated voltage shall not be less than 205% of full load torque. It (h). Speed switches mounted on the motor shaft shall be provided in cases where above requirements are not met. (i)Motors shall be capable of restarting under full load after a momentary loss of voltage with the possibility of 150 % nominal voltage during fast bus transfer.
7	LOCKED ROTOR WITHSTAND TIME	Locked rotor withstand time of motors under hot condition at highest voltage limit shall be as follows: a) For motors with starting time up to 20 sec. - At least 2.5 sec. more than starting time. b) For motor with starting time above 20 secs and up to 45 secs. - At least 5.0 sec. more than starting time. c) For motors with starting time above 45 secs. - At least 10% more than starting time. The starting time of the motor referred above is at minimum permissible voltage. For motors and in cases where the above requirements are not complied with, speed switches of approved make & type shall be provided to bypass the locked rotor protection for a pre-selected time during starting of motors. The speed switches shall have one NO & one NC contacts having maximum interrupting capacity of 5 Amps at 240V AC and 0.25 amps at 220 V DC	(a) Under hot condition at 110% rated voltage shall be more than motor starting time by at least 3 seconds for motors up to 20 seconds starting time and by 5 seconds for motor with more than 20 seconds starting time at minimum permissible voltage of 80% rated voltage.	(a) The locked rotor withstand time under hot condition at 110% rated voltage shall be more than motor starting time by at least 2.5 seconds for motors up to 20 seconds starting time and by 5 seconds for motor with more than 20 seconds starting time and upto 45 secs starting time. (b)For motors with starting time more than 45 secs. at minimum permissible voltage during starting, the locked rotor withstand time under hot condition at highest voltage limit shall be more than starting time by at least 10% of the starting time.	Locked rotor withstand time of motors under hot condition at highest voltage limit shall be as follows: a) For motors with starting time up to 20 sec. - At least 2.5 sec. more than starting time. b) For motor with starting time above 20 secs and up to 45 secs. - At least 5.0 sec. more than starting time. c) For motors with starting time above 45 secs. - At least 10% more than starting time. The starting time of the motor referred above is at minimum permissible voltage. For motors and in cases where the above requirements are not complied with, speed switches of approved make & type shall be provided to bypass the locked rotor protection for a pre-selected time during starting of motors. The speed switches shall have one NO & one NC contacts having maximum interrupting capacity of 5	i. For motors with starting time less than 20 secs at minimum permissible voltage during starting, the locked rotor withstand time under hot condition at highest voltage limit shall be at least 2.5 secs more than starting time. ii. For motors with starting time more than 20 secs and up to 45 secs at minimum permissible voltage during starting, the locked rotor withstand time under hot condition at highest voltage limit shall be at least 5 secs more than starting time. iii. For motors with starting time more than 45 secs at minimum permissible voltage during starting, the locked rotor withstand time under hot condition at highest voltage limit shall be more than starting time by at least 10% of the
8	ENCLOSURE	Indoor motors shall conform to degree of protection IP: 54 as per IS: 4691. Outdoor motors shall conform to degree of protection IP: 55 as per IS: 4691 and shall be of weather-proof construction rain canopy (Rain canopy provided for the outdoor HT motors shall be removable type) shall be provided for outdoor motors.	All motor enclosures for outdoor, semi-outdoor & indoor application shall conform to the degree of protection IP-55. Motor for outdoor or semi-outdoor service shall be of weather-proof construction with canopy.	All motor enclosures shall conform to the degree of protection IPW-55 unless otherwise specified. Motor for outdoor or semi-outdoor service shall be of weather-proof construction with canopy.	Indoor motors shall conform to degree of protection IP: 54 as per IS: 4691. Outdoor motors shall conform to degree of protection IP: 55 as per IS: 4691 and shall be of weather-proof construction rain canopy (Rain canopy provided for the outdoor HT motors shall be removable type) shall be provided	All motor enclosures for outdoor, semi-outdoor & indoor application shall conform to the degree of protection IP-55 (For Outdoor) and IP-54 (For Indoor) unless otherwise specified. Motor for outdoor or semi-outdoor service shall be of weather-proof construction with canopy.

SL.NO.	PARAMETERS	SPECIFIC TECHNICAL REQUIREMENTS OF ELECTRICAL MOTOR					SPEC NO- PE-TS- 405-165-N004.
		TYPE-I	TYPE-II	TYPE-III	TYPE-IV	TYPE-V	
9	COOLING	Motors shall generally have totally enclosed fan cooled (TEFC) or totally enclosed tube ventilated (TETV) enclosures or Closed Air circuit Air (CACA) cooled type. However, motors rated 3000KW or above shall be Closed air circuit water cooled (CACW).	The motor shall be self ventilated type, either totally enclosed fan cooled IC 411(TEFC), totally enclosed tube ventilated IC 511(TETV) or closed air circuit air cooled IC 611(CACA).	(TEFC) or closed air circuit air- cooled (CACA). For large capacity motors, totally enclosed tube ventilation (TETV) cooling system shall be considered.	Motors shall generally have totally enclosed fan cooled (TEFC) or totally enclosed tube ventilated (TETV) enclosures or Closed Air circuit Air (CACA), the method of cooling conforming to IC-0141 or IC-0151 or IC-0161 of IS: 6362 up to 3000 kW motor	The motors shall be either totally enclosed fan cooled (TEFC) or totally enclosed tube ventilated (TETV) or Closed air circuit air cooled (CACA) type. Motors with CACA heat exchangers shall have dial	
10	WINDING AND INSULATION	LT motors shall have class F insulation. The temperature rise of all motors shall be limited to the limits applicable to Class 'B' insulation. In case of continuous operation at extreme voltage limits, 10deg C rise above the temperature limits specified in IS: 325 shall be permissible.	(a) All insulated winding shall be of copper. (b) Class F insulation but limited to class B temperature rise.	(a) All insulated winding shall be of copper. (b) All motors shall have class F insulation but limited to class B temperature rise. © Windings shall be impregnated to make them non-hygroscopic and oil resistant.	LT motors shall have class F insulation. The temperature rise of all motors shall be limited to the limits applicable to Class 'B' insulation. In case of continuous operation at extreme voltage limits, 10deg C rise above the temperature limits specified in IS: 325 shall be permissible.	(a) Class F insulation but limited to class B temperature rise. (b) Windings shall be impregnated to make them non-hygroscopic and oil and flame resistant.	
11	TROPICAL PROTECTION		(a) All motors shall have fungus protection involving special treatment of insulation and metal against fungus, insects and corrosion.				
			(b) All fittings and hardwares shall be corrosion resistant.				
12	BEARINGS		(a) Motor shall be provided with antifriction bearings, unless sleeve bearings are required by the motor application. Bearings shall be rated for minimum service life of 40,000Hrs.				
			(b) Vertical shaft motors shall be provided with thrust and guide bearings. Thrust bearing of tilting pad type is preferred.				
			(c) Bearings shall be provided with seals to prevent leakage of lubricant or entrance of foreign matters like dirt, water etc. into the bearing area.				
			(d) Grease lubricated bearings shall be pre-lubricated and shall have provisions for in-service positive lubrication with drains to guard against over lubrication.				
			(e) Bearings shall be insulated as required to prevent shaft current and resultant bearing damage.				
13	MOTOR TERMINAL BOX	(a) phase terminal boxes of horizontal motors shall be positioned on the left hand side of the motor when viewed from the non-driving end. (b) Separate terminal boxes shall be provided for space heaters and temp. Indicators. Detachable gland plates with double compression tinned brass glands shall be provided in terminal boxes. (c) Terminal box shall be capable of being turned 360 Deg. in steps of 90 Deg. However, in the case of rectangular type, Terminal Box shall be rotatable in steps of 180 Deg.	(a) Motor terminal box shall be detachable type and located in accordance with Indian Standards clearing the motor base- plate/ foundation.	(a) Motor terminal box shall be detachable type and located in accordance with Indian Standards clearing the motor base- plate/ foundation (b) Terminal box shall be capable of being turned 360 Deg. in steps of 900 Deg. for	(a) phase terminal boxes of horizontal motors shall be positioned on the left hand side of the motor when viewed from the non-driving end.	(a) Motor terminal box shall be detachable type and located in accordance with Indian Standards clearing the motor base- plate/ foundation	
			(b) Terminal box shall be capable of being turned 360 Deg. in steps of 90 degree for LV motors unless otherwise approved.				
			(c) The terminal box shall be split type with removable cover with access to connections and shall have the same degree of protection as motor.				
			(d) Terminals shall be stud or lead wire type, substantially constructed and thoroughly insulated from the frame				
			(e) The terminals shall be clearly identified by phase markings, with corresponding direction of rotation marked on the non-driving end of the motor.				
			(f) The terminal box shall be capable of withstanding maximum system fault current for a duration of 0.25 sec.				
			(g) Motor terminal box shall be furnished with suitable cable lugs and double compression brass glands to match with cable used.				
			(h) Degree of protection for terminal boxes shall be IP 55 as per IS 4691.				
			(i) unless otherwise specified or approved, phase terminal boxes of horizontal motors shall be positioned on the left hand side of the motor when viewed from the non-driving end.				
			(j) Connections shall be such that when the supply leads R, Y & B are connected to motor terminals A B & C or U, V & W respectively, motor shall rotate in an anticlockwise direction when viewed from the non-driving end. Where such motors require clockwise rotation, the supply leads R, Y, B will be connected to motor terminals A, C, B or U W & V respectively.				
14	MINIMUM PHASE TO PHASE & PHASE TO EARTH CLEARANCE FOR 415V		25 mm	25 mm		Minimum inter-phase and phase-earth air clearances for LT motors with lugs installed shall be as follows:- Motor MCR in KW Clearance (i) UP to 110 KW - 10mm (ii) Above 110 KW and upto 150 KW - 12.5mm (ii) Above 150 KW - 19mm	
15	GROUNDING		(a) The frame of each motor shall be provided with two separate and distinct grounding pads complete with tapped hole, GI bolts and washer to accommodate Flat ground conductor (shall be finalised during deatil engineering).	The frame of each motor shall be provided with two separate and distinct grounding pads complete with tapped hole, GI bolts and washer.		The frame of each motor shall be provided with two separate and distinct grounding pads complete with tapped hole, GI bolts and washer.	
			(b) The cable terminal box shall have a separate grounding pad.				

SL.NO.	PARAMETERS	SPECFIIC TECHNICAL REQUIREMENTS OF ELECTRICAL MOTOR SPEC NO- PE-TS- 405-165-N004.				
		TYPE-I	TYPE-II	TYPE-III	TYPE-IV	TYPE-V
	GROUNDING CONDUCTORS					
16	RATING PLATE		In addition to the minimum information required by IS, the following information shall be shown on motor rating plate : (a) Temperature rise in Deg.C under rated condition and method of measurement.			
			(b) Degree of protection.			
			(c) Bearing identification no. and recommended lubricant.			
17	DRAIN PLUG		Motor shall have drain plugs so located that they will drain the water, resulting from the condensation or other causes from all pockets of the motor casing.			
18	LIFTING PROVISIONS		Motor weighing 20 Kg. or more shall be provided with eyebolt or other adequate provision of lifting.			
19	PAINTING		Unless otherwise specified, the colour of finish shall be grey to Shade No. 631 and 632 as per IS:5 for motors installed indoor and outdoor respectively. The paint shall be epoxy based and shall be suitable for withstanding specified site conditions subject to Customer's approval during detailed engineering.			
20	TESTS	Type Tests type test reports for type tests as per IS: 325/ IS: 12615 conducted on equipment similar to those proposed to be supplied and carried out within last ten years shall be submitted. However, if such reports are not available, one motor of each type shall be subjected to type tests for free of cost. Routine Tests All motors shall be subjected to routine tests as per IS: 325/ IS: 12615 in the presence of customer or customer representative.	All motors shall be subjected to Type tests & routine tests as per IS: 325 and approved quality plan.	Routine and Type Tests are to be conducted in presence of customer's representative as per IS:325 and in addition,any special test called for in the driven equipment specification shall be performed and required copies of test certificates are to be furnished for approval. In addition, following Type tests shall have to be carried out in presence of Owner representative on all 3.3kV/11kV motors. a) Impulse test by 1.2 / 50 micro sec. On sample coil of Stator winding insulation as type test as per IEC-671/IS-14422 : 1995 test voltages as under : Voltage rating of motor Impulse Test Voltage 3.3 kV 18 kV peak 11 kV 49 kV peak b) Tan delta, charging current and dielectric loss measurements on each phase of motor stator winding as routine test. c) Polarization Index Test as per IS:7816 as routine test d) Test for suitability of IPW– 55(Weather proof) as per IS 4691 as type test. Type test certificate for first numeral shall be acceptable in lieu to test, provided the test motor is identical to motor being supplied. e) Fault Withstand Test for main terminal box as type test. Type test certificate shall be acceptable, if the test has been conducted on exactly identical terminal box. f) Test for noise level as routine test. g) Test for vibration as routine test. h) Tan delta measurement on coils. i) Surge withstand test for inter turn insulation. j) Test to diagnose rotor bar failure during manufacture. Tests indicated at (h), (i), (j) shall be carried out during manufacture of the coils and shall be furnished for verification.	Type Tests type test reports for type tests as per IS: 325/ IS: 12615 conducted on equipment similar to those proposed to be supplied and carried out within last five years shall be submitted. However, if such reports are not available, one motor of each type shall be subjected to type tests for free of cost. Routine Tests All motors shall be subjected to routine tests as per IS: 325/ IS: 12615 in the presence of customer or customer representative.	Routine and Type Tests are to be conducted in presence of customer's representative as per IS:325 and in addition,any special test called for in the driven equipment specification shall be performed and required copies of test certificates are to be furnished for approval.
21	DRAWINGS TO BE SUBMITTED AFTER AWARD OF CONTRACT		DRAWINGS TO BE SUBMITTED AFTER AWARD OF CONTRACT a) OGA drawing showing the position of terminal boxes, earthing connections etc.			
			b) Arrangement drawing of terminal boxes.			
22	MINIMUM STARTING VOLTAGE FOR MOTOR	85% for motor ratings below 110kW 80% for motor ratings from 110kW to 200kW			85% for motor ratings upto 1000kW	
23	SHORT TIME RATING FOR TERMINAL BOXEX	90 kW and above (Breaker : 50 KA for 0.25 sec. Controlled) Below 90 kW (Contactor : 50 KA protected by HRC fuse Controlled)			90 kW and above (Breaker : 50 KA for 0.25 sec. Controlled) Below 90 kW (Contactor : 50 KA protected by HRC fuse Controlled)	



TITLE:

**TECHNICAL SPECIFICATION
OF RATE CONTRACT
SELF CLEANING STRAINER (SCS)**

SPECIFIC TECHNICAL REQUIREMENTS

SPEC. NO.: **PE-TS-RC-165-N004**

SECTION: **I**

SUB-SECTION: **IC**

REV. NO. **0** DATE **24.03.2017**

SHEET **1** OF **1**

SUB-SECTION – IC

SPECIFIC TECHNICAL REQUIREMENTS (C &I)

SPECIFIC C&I TECHNICAL REQUIREMENTS
FOR SELF CLEANING STRAINERS

(APPLICABLE FOR TYPE I TO V)

- 1.1 The make/model of various instruments/items/systems shall be subject to approval of owner/purchaser during detailed engineering stage. The Vendor list/ sub-vendor list shall be subject to BHEL / Customer approval during contract stage. No commercial implication in this regard shall be acceptable.
- 1.2 These requirements are to be read in conjunction with detailed Technical specification enclosed in the specification. In case of any conflict and repetition of clauses in the specification, the more stringent requirement as per interpretation of Customer shall prevail without any commercial implication. No deviations shall be acceptable.
- 1.3 Drawings/Documents and data to be furnished after award of the contract as per deliverables list attached elsewhere in the specification.
- 1.4 All local gauges as well as transmitters and sensors for parameters like pressure, temperature, flow etc. as required for the safe and efficient operation and maintenance under the scope of specification shall be provided. The necessary root valves, impulse piping, drain cock, gauge-zeroing cocks, valve manifolds, instrument racks and all the other accessories required for mounting / erection of these local instruments, transmitters and sensors shall be supplied by bidder even if not specifically asked for. Also the proposal shall include the necessary cables, flexible conduits, instrument racks, junction boxes and accessories for the above purpose. Double root valves shall be provided for all pressure tapping where the pressure exceeds 40 Kg / Cm².
- 1.5 All local gauges, transmitters and sensors shall be mounted on suitable enclosures, Instrument racks (LIR) in bidder's scope subject to Customer's approval.
- 1.6 Type of control system shall be DDCMIS (Station C&I) based, located in Central Control Room in BHEL scope. Field instrumentation for the package is in bidder's scope.
- 1.7 The local control cum starter panel in bidder's scope shall be NEMA 4X. Suitable canopy on top shall be provided for the panel.
- 1.8 Push buttons and indication lamps for Open/Close and Start/Stop of drives/equipment's shall be provided on the starter panel. Remote and local indication, indicating lamps / LED cluster for instruments/drives/equipment's status and critical alarms shall be provided on the starter panel. Nos. shall be decided during detailed engineering.
- 1.9 Colored MIMICS on the panel is to be provided as per system flow diagram. No. of facia on Starter panel shall be decided during detailed engineering.

SPECIFIC C&I TECHNICAL REQUIREMENTS
FOR SELF CLEANING STRAINERS

(APPLICABLE FOR TYPE I TO V)

- 1.10 Bidder to terminate all instrumentation and control elements in the control panel for further cabling to DDCMIS by BHEL.
- 1.11 All field instruments shall be weatherproof, drip tight, dust tight and splash proof suitable for use under outdoor ambient conditions prevalent in the subject plant. All field-mounted instruments shall be mounted in suitable locations where maximum accessibility for maintenance is achieved. The enclosures of all electronic instruments shall conform to IP-65 unless otherwise specified (Explosion proof for NEC article 500, class 1, Division 1 area & flame proof) and an anticorrosive paint shall be applied to the field mounted enclosures / instruments. All the field instruments shall also be provided with SS tag nameplate and double compression type Nickel-plated brass cable gland. Gaskets, Fasteners, Counter and mating flange shall also be included wherever required with the field instruments.
- 1.12 Sea or saline water media is applicable for TYPE-III, TYPE-IV and TYPE-V. The minimum requirement for sea water or saline water media is as below:
- a. Instruments shall be suitable for sea or saline water application. MOC of impulse tubing and impulse pipe shall be CPVC (3/8") Sch 80 or better, Industrial grade up to manifold. MOC of impulse tubing, fittings (from manifold to instrument) and manifold shall be Super Duplex stainless steel.
 - b. MOC of all wetted parts, fittings, sampling pipes, tubes, fittings, diaphragm and all types of erection hardware of instrument/drives/equipment, shall be Duplex stainless steel or better suitable for sea or saline water application.
- 1.13 Epoxy coated painting is required for all I & C equipment.
- 1.14 All valve actuator shall be provided with conventional actuators with integral starter for ON/OFF valves. Non-contact type electronic 2-wire position transmitters shall be provided for all inching type motorized valves and dampers. The detailed specification of actuator is given elsewhere in the specification.
- 1.15 Differential pressure indicators & Differential pressure Transmitters across Self-cleaning strainer shall be provided with independent impulse & isolation valves. Remote & Local indication DP transmitters & gauges across self-cleaning strainer shall be provided.
- 1.16 All the transmitters and gauges shall have remote seal type having 15m capillary length minimum.
- 1.17 All the instruments/equipment's/electrical items shall be provided & designed with maximum star rating as available in line with energy conservation policies notified by BEE, GOI at the time of supply.

SPECIFIC C&I TECHNICAL REQUIREMENTS
FOR SELF CLEANING STRAINERS

(APPLICABLE FOR TYPE I TO V)

- 1.18 All primary instruments shall be with protection class of IP 65 or better.
- 1.19 Transmitter should not be mounted directly on the manifold, Manifold shall be non-integral and standalone type.
- 1.20 LVDT type instrument is not acceptable.
- 1.21 All limit switch shall be conforming to IEC-60947-5-1.
- 1.22 Each switching element including the limit and torque switches of valve actuators shall be provided with minimum two SPDT OR DPDT contacts each for close, open and adjustable.
- 1.23 All transmitters shall be smart and electronic type, microprocessor based and HART compatible. All instruments should be supplied with valid calibration and test certificates provided by OEM.
- 1.24 The system shall be provided with annunciation system. It shall be an integral part of the control system. All the field contact shall be acquired through control system. The annunciation sequence/ logic shall conform to ISA sequence ISA-2A. The window lamps for the system shall be driven through output modules of the control system.
- 1.25 For plug in type instruments, the plug & sockets shall be polarized to prevent wrong connections and have facility for secure coupling in plug-in position to prevent loose connections.
- 1.26 Signal/Electrical connection shall be screwed connection with double compression type Nickel-plated brass cable glands.
- 1.27 All the field instruments shall also be provided with SS tag nameplate.
- 1.28 Cable scope shall be referred in Electrical scope sheet attached in the Electrical portion of the specification.
- 1.29 Push buttons and indication lamps for Open/Close and Start/Stop of drives/equipment's shall be provided on the starter panel in Bidder's scope. Remote and local indication, indicating lamps / LED cluster for instruments/drives/equipment's status and critical alarms shall be provided on the starter panel. Nos. shall be decided during detailed engineering.
- 1.30 Mandatory spare list shall be referred in 'List of mandatory spares' attached elsewhere in the specification and shall be supplied by bidder.
- 1.31 Power Supply Requirement:
415 V, 3 phase AC power supply shall be provided by Customer for the local control cum starter panel at a single point. Further any electrical distribution shall be in bidder's scope. Any other voltage requirement to be

SPECIFIC C&I TECHNICAL REQUIREMENTS
FOR SELF CLEANING STRAINERS

(APPLICABLE FOR TYPE I TO V)

arranged/derived by bidder by providing suitable control transformer. Starter panel in bidder's scope shall have provision for redundant feeder with fast automatic changeover.

- 1.32 Bidder shall provide an unlimited warranty on all equipment and software for three years after the start of the warranty period, i.e. after satisfactory completion of initial operations. This warranty shall include repair, replacement or correction of identified software or hardware discrepancies at no cost to owner.
- 1.33 Bidder to delegate /depute their persons/experts as per Customer's requirement.
- 1.34 Bidder must offer general tools and tackles and special calibration instruments required during start-up, trial run, operation and maintenance of the system.
- 1.35 The technical requirements for instruments/ equipment's/panels mentioned in the specification are minimum requirements. Items not specifically mentioned and required for the completeness of the system shall be supplied by bidder.

2.0 Requirements for flanged remote seal diaphragm:

Maximum pressure rating: To meet 200 percent of process pressure,
Availability of seals: for both high and low pressure sides with capillary connection in case of differential pressure measurements.
Single Capillary connection for pressure transmitters.
Capillary length: 15.0 m
Fill fluid: Suitable oil
Process connection size: 1 inch
Flange size and Accessories: As per process requirement.
Flange pressure rating: Required Class (ANSI)
Process fluid temperature: 25°C to 60°C
Diaphragm and wetted part material: Suitable for sea water (Duplex SS or better)
Flushing option: To be made available with 1/4 inch (necessary drain and gasket suitable for sea water application to be provided).
Snubbers /Pulsation dampeners shall be used where the process media is unstable for measurement such as the discharge of a pump.

SCOPE MATRIX - SELF CLEANING STRAINER (SCS)

S.No.	PROJECT	TYPE- I	TYPE- II	TYPE- III	TYPE- IV	TYPE- V
1	SYSTEM APPLICABLE: SELF CLEANING STRAINER	Y	Y	Y	Y	Y
2	SYSTEM CONFIGURATION: UNITISED OR COMMON OR AS APPLICABLE	UNITISED				
3	CONTROL SYSTEM	REFER NOTE-1				
4	LOCATION OF CONTROL SYSTEM					
5	CONTROL SYSTEM SCOPE (BIDDER/BHEL/ CUSTOMER)					
6	CONTROL FROM PB's ON STARTER PANEL	Y; REFER NOTE 3				
7	ANNUNCIATION ON STARTER PANEL (Y/N) -- IF Y, MIN NO. OF HARDWIRED ALARMS / INDICATIONS	Y; REFER NOTE-4				
8	MIMIC ON LCP (Y/N)	Y; REFER NOTE-5				
9	ACTUATOR WITH INTEGRAL STARTER (Y/N)	Y	Y	Y	Y	Y
10	DPG/ DPT per Self cleaning Strainer *	DIFFERENTIAL PRESSURE TRANSMITTER = 2 nos. (Across each strainer) DIFFERENTIAL PRESSURE GAUGE = 1 no. (Across each strainer)				
11	SEA WATER APPLICATION	N	N	Y	Y	Y
	NOTES:					
1	Type of control system shall be DDCMIS (Station C&I) based, located in Central Control Room in BHEL scope. Field instrumentation for the package is in bidder's scope.					
2	Local control cum starter panel for SCS is in bidder's scope of supply. Items not specifically mentioned and required for the completeness of the system shall be supplied by					
3	Push buttons and indication lamps for open/close and Start/stop of drives/equipments for SCS shall be provided on the starter panel. Remote and local indication,indicating lamps/LED cluster for instruments/drives/equipments status and critical alarms shall be provided on starter panel for SCS. Nos. shall be decided during detailed engineering.					
4	No. of facia shall be decided during detailed engineering.					
5	Colored MIMICS on Local control cum starter panel to be provided as per system flow diagram.					
6	415 V, 3 phase AC power supply shall be provided by BHEL at a single point for the starter panel. Further any electrical distribution shall be in bidder's scope. Any other voltage requirement to be arranged/derived by bidder by providing suitable control transformer. Starter panel in bidder's scope shall have provision for redundant feeder with fast automatic changeover.					
7	Bidder to terminate all instrumentation and control elements in the local control cum starter panel for further cabling to DDCMIS. Complete cable schedule (in BHEL excel format provided in electrical portion of the specification) and cable interconnection details from field to Local control cum Starter panel and ,Local control cum Starter panel to DDCMIS shall be provided by bidder.					
8	Following documents shall be provided by bidder during detailed engineering for approval: a. Input/Output list, Drives list, b. Instrument datasheets and check lists/Quality plan, c. Panel external/internal GA drawing and termination details, d. Panel datasheet and QAP e. Recommended control logics / Control philosophy . f. Cable schedule (in BHEL excel format provided in electrical portion of the specification) & cable interconnection details from field to Local control cum Starter panel and, Local control cum starter panel to DDCMIS.					
9	All the instruments along with necessary fittings, accessories and valve manifold etc., instrument rack and junction boxes, erection hardware shall be in bidder's scope of					
10	LIR (Instrument Rack) to be provided for mounting the instruments in the field.					
11	Cable for local wiring, between field instruments to Starter panel shall be screened with 1.5 mm2 minimum and shall be in bidder's scope. Refer 'electrical scope sheet between BHEL and bidder' attached in electrical specification for cable scope.					
12	Mandatory spare list shall be referred in 'List of mandatory spares' attached elsewhere in the specification and shall be supplied by bidder.					
13	*Instruments, root valves, impulse pipe shall be suitable for sea water application having corrosion resistance where media is sea water. All the transmitters and gauges shall have remote seal type having 15m capillary length.					
14	The Vendor list/ sub-vendor list shall be subject to BHEL/Customer approval during contract stage.					
15	The specifications for instruments mentioned in the specification are minimum requirements. The detailed specifications shall be finalized during detail engineering.					
16	No deviations with respect to technical specification shall be acceptable.					
17	Local control cum starter panel can be common for two streams of Self cleaning strainers (left and right) for One Unit.					



**DATA SHEET FOR
PRESSURE / DIFFERENTIAL PRESSURE GAUGE
FOR SELF CLEANING STRAINER
(APPLICABLE FOR TYPES- I to V)**

SPECIFICATION NO.: PE-TS-XXX-145-I100

VOLUME

SECTION

REV. NO.

00

DATE: 28.03.2017

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OF

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TAG No. Qty.....

Data Sheet No.: **PE-DC-999-145-I026**

Data Sheet A & B

DATA SHEET-A FOR PRESSURE / DIFFERENTIAL PRESSURE GAUGE
(TO BE FILLED BY PURCHASER)

DATA SHEET-B
(TO BE FILLED-UP BY BIDDER)

GENERAL	MANUFACTURER		
	MODEL NUMBER		
TECHNICAL	PRESSURE ELEMENT	☐ BOURDON ☐ DIAPHRAGM ☐ BELLOW	
	MATERIAL	THE MINIMUM REQUIREMENT FOR SEA WATER APPLICATION : ALL WETTED PARTS & DIAPHRAGM SHALL BE SUITABLE FOR SEA WATER (DUPLEX SS OR BETTER)	
	A) BELLOW	■ 316 SS	
	B) BOURDON TUBE	■ 316 SS	
	C) MOVEMENT	■ 316 SS	
	D) CASE ENCLOSURE	■ 316 SS	
	E) PROTECTIVE DIAPHRAGM	■ TEFLON COATED SEALS	
	ENCLOSURE	■ IP-65 OR BETTER	
	DIAL	SIZE: ☐ 100MM ■ 150MM WITH SHATTER PROOF GLASS COLOR: WHITE NUMERALS: BLACK SCALE: ■ LINEAR, 270 DEG ARC GRADUATED IN METRIC UNITS	
	CASE	COLOUR : BLACK	
	MOUNTING	■ LOCAL/FRAME MOUNTED ■ INSTRUMENT RACK	
	OVER RANGE PROTECTION	☐ 115% OF MAX. OF SCALE ■ 150% OF MAX. OF SCALE	
	CAPILLARY LENGTH	■ MINIMUM LENGTH OF 15 M REQUIRED	
	BLOW OUT DISC	■ REQUIRED WITH OPEN FRONT CONSTRUCTION OF SUITABLE MATERIAL	
	SWITCHING FACILITY	■ YES ☐ NO	
TYPE	☐ MICRO SWITCH ☐ OTHER		
NO. / TYPE OF CONTACTS	2 NOS. SPDT		
CONTACT RATING	5A 230V AC, 0.25A 220V DC		
SETTING RANGE	FIELD ADJUSTABLE OVER FULL RANGE;		
RANGE SELECTION	COVERS 125% OF MAX. OF SCALE		
REPEATABILITY	± 1% OF FSR		
POWER SUPPLY	☐ 230V AC ☐ 110V AC		
	OVER RANGE TEST	TEST PR. FOR THE ASSEMBLY SHALL BE 1.5 TO THE MAX. DESIGN PRESSURE AT 38 DEG C.	
	ZERO/ SPAN ADJUSTMENT	■ MICROMETER SCREW EXTERNAL FOR ZERO ADJUSTMENT ■ MICROMETER SCREW INTERNAL FOR RANGE ADJUSTMENT	

	DATA SHEET FOR PRESSURE / DIFFERENTIAL PRESSURE GAUGE FOR SELF CLEANING STRAINER (APPLICABLE FOR TYPES- I to V)			SPECIFICATION NO.: PE-TS-XXX-145-I100		
				VOLUME		
				SECTION		
				REV. NO.	00	DATE: 28.03.2017
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TAG No. Qty.....			Data Sheet No.: PE-DC-999-145-I026			
Data Sheet A & B						
DATA SHEET-A FOR PRESSURE / DIFFERENTIAL PRESSURE GAUGE (TO BE FILLED BY PURCHASER)				DATA SHEET-B (TO BE FILLED-UP BY BIDDER)		
PERFORMANCE	ACCURACY	± 1% OR BETTER OF FULL SCALE DEFLECTION				
CONNECTION	PROCESS	½ " NPT (M)				
	LOCATION	☐ BACK ☐ BOTTOM				
ACCESSORIES	NAME PLATE / METAL TAG	SS				
	MOUNTING	☐ WALL ☐ PIPE – U CLAMPS & BOLTS ☐ PANEL / RACK TO BE DECIDED DURING DETAILED ENGG.				
		3 WAY NEEDLE VALVE / MANIFOLDS PROTECTIVE SEPARATING, CHEMICAL SEAL DIAPHRAGM – FOR CORROSIVE LIQUID LINES Union, nut & tail piece and other Installation accessories as required. 3-Way SS316 Gauge cock for pressure gauges				
NAME				NAME		
SIGNATURE				SIGNATURE		
DATE				DATE		



DATA SHEET FOR PRESSURE / DIFFERENTIAL PRESSURE TRANSMITTER FOR SELF CLEANING STRAINERS

(APPLICABLE FOR TYPE-I TO V)

SPECIFICATION NO.: PE-TS-XXX-145-I100

VOLUME

SECTION

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TAG No. Qty.....

Data Sheet No.: **PES-145-01-DS1-0****Data Sheet A & B**DATA SHEET-A FOR PRESSURE / DIFFERENTIAL PRESSURE TRANSMITTER
(TO BE FILLED BY PURCHASER)DATA SHEET-B
(TO BE FILLED-UP BY BIDDER)

	MANUFACTURER		
	MODEL NUMBER		
TECHNICAL	TYPE	☐ CAPACITANCE ☐ SILICON RESONANCE TYPE	SMART TRANSMITTER OF ELECTRONIC TYPE, MICROPROCESSOR BASED, HART COMPATIBLE
	POWER SUPPLY	☐ 24V DC NOMINAL	
	TRANSMITTER MEASUREMENT	☐ PRESSURE ☐ DIFF. PRESSURE	
	OUTPUT SIGNAL	☐ 4 to 20 m Amp. DC	
	NO. OF WIRE	☐ TWO	
	ACCURACY	☐ ± 0.04% of span or better	
	LINEARITY, HYSTERESIS, DEAD BAND AND REPEATABILITY	☐ ± 0.05 % of span or better	
	STABILITY	☐ ± 0.1 % OF URL FOR 10 years	
	SENSITIVITY	☐ ± 0.05% OF SPAN	
	<u>MATERIAL</u>	THE MINIMUM REQUIREMENT FOR SEA WATER APPLICATION : ALL WETTED PARTS & DIAPHRAGM SHALL BE SUITABLE FOR SEA WATER (DUPLEX SS OR BETTER)	
	A) BODY	☐ 316 SS	
	B) ELEMENT	☐ 316 SS	
	C) DIAPHRAGM	☐ 316 SS	
	C) SEAL	☐ TEFLON	
	FLANGED REMOTE SEAL DIAPHRAGM	AS REQUIRED	
	CAPILLARY LENGTH	☐ MINIMUM LENGTH OF 15 M REQUIRED	
	CONTINUOUSLY ADJUSTABLE SPAN AND ZERO ADJUSTMENT PROVIDED	☐ YES, Locally adjustable, non-interacting ☐ NO	
	MOUNTING	☐ WALL/PIPE STAND ☐ INSTRUMENT RACK	
	ENCLOSURE	☐ NEMA-4 ☐ NEMA-7 ☐ IP-65 WITH CORROSION RESISTANCE EPOXY COATING	
	PAINT	☐ EPOXY COATING FOR ALL C&I EQUIPMENT ☐ Anticorrosive paint shall be applied to field mounted enclosures / instruments.	
TURN DOWN RATIO	☐ 100:1 in general		



DATA SHEET FOR PRESSURE / DIFFERENTIAL PRESSURE TRANSMITTER FOR SELF CLEANING STRAINERS

(APPLICABLE FOR TYPE-I TO V)

SPECIFICATION NO.: PE-TS-XXX-145-I100

VOLUME

SECTION

REV. NO. 00 DATE: 28.03.2017

SHEET 2 OF 2

TAG No. Qty.....

Data Sheet No.: **PES-145-01-DS1-0**

Data Sheet A & B

DATA SHEET-A FOR PRESSURE / DIFFERENTIAL PRESSURE TRANSMITTER
(TO BE FILLED BY PURCHASER)

DATA SHEET-B
(TO BE FILLED-UP BY BIDDER)

INSULATION RESISTANCE	TO BE SPECIFIED BY BIDDER	
OVER PRESSURE	☒ 150% OF MAX. OPR. PRESS	
ZERO SUPPRESSION/ ELEVATION RANGE	☒ At least 100% of Span	
INTEGRAL INDICATOR	☒ YES, LCD indicator (5 digit) with scale of Engg. unit ☐ NO	
RESPONSE TIME	☒ 150 msec.	
TRANSMITTER SHALL BE ABLE TO DRIVE LOAD IMPEDANCE OF 500 OHMS(min.) WITH DRIVE CAPABILITY OF 600OHMS NOMINAL	☒ YES ☐ NO	
ELECTRICAL CONNECTION	☒ PLUG & SOCKET TYPE	
PROCESS CONNECTION	☒ 1/2 " NPT (F)	
ZERO & SPAN DRIFT	☒ ± 0.015 % PER DEG.C AT MAX. SPAN ☒ ± 0.11 % PER DEG.C AT MIN. SPAN	
DIAGNOSTICS	☒ SELF INDICATING FEATURE	
<u>MANIFOLD</u>		
a) PRESSURE MEASUREMENT	☒ 2 WAY ☒ MATERIAL: 316 SS	
B) DIFFERENTIAL PRESSURE MEASUREMENT	☒ 5 WAY ☒ MATERIAL: 316 SS	
CABLE ENTRY DETAIL	SUITABLE FOR DIA OF 17.5 mm	
NOTES: 1. TRANSMITTERS SHOULD NOT BE MOUNTED DIRECTLY ON MANIFOLD. MANIFOLD SHOULD BE NON-INTEGRAL AND STAND ALONE TYPE. 2. TRANSMITTERS TO BE EQUIPPED WITH MOUNTING BRACKETS. 3. ALL THE FIELD INSTRUMENTS SHALL BE PROVIDED WITH SS TAG NAME PLATE.		

NAME SIGNATURE DATE	PREPARED BY	CHECKED BY	APPROVED BY	COMPANY SEAL NAME SIGNATURE DATE



**SPECIFICATION FOR
MOTORISED VALVE ACTUATOR
FOR SELF CLEANING STRAINERS
(APPLICABLE FOR TYPES- I TO V)**

SPECIFICATION NO.: PE-DG-XXX-145-I902

VOLUME II B

SECTION D

REV. NO.

00

DATE: 28.03.2017

SHEET

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Data Sheet A & B

DATA SHEET-A
(TO BE FILLED BY PURCHASER)

DATA SHEET-B
(TO BE FILLED-UP BY BIDDER)

GENERAL*	* PROJECT				
	OFFER REFERENCE				
	* TAG NO. SERVICE				
	* DUTY	☐ ON / OFF	☐ INCHING		
	* LINE SIZE (inlet/outlet): MATERIAL				
	* VALVE TYPE	☐ GLOBE ☐ GATE ☐ REG. GLOBE ☐ BUTTERFLY			
	* OPENING / CLOSING TIME				
	* WORKING PRESSURE				
	AMBIENT CONDITION	SHALL BE SUITABLE FOR CONTINUOUS OPERATION UNDER AN AMBIENT TEMP. OF 0-55 DEG C AND RELATIVE HUMIDITY OF 0-95%			
	VALVE SEAT TEST PRESS	BIDDER TO SPECIFY			
	REQUIRED VALVE TORQUE	BIDDER TO SPECIFY			
	ACTUATOR RATED TORQUE	BIDDER TO SPECIFY			
CONSTRUCTION AND SIZING	CONSTRUCTION	TOTALLY ENCLOSED, WEATHER PROOF, IP:68			
	MECHANICAL POSITION INDICATOR	TO BE PROVIDED FOR 0-100% TRAVEL			
	BEARINGS	DOUBLE SHIELDED, GREASE LUBRICATED ANTI-FRICTION.			
	GEAR TRAIN FOR LIMIT SWITCH/TORQUE SWITCH OPERATION	METAL (NOT FIBRE GEARS). SELF-LOCKING TO PREVENT DRIFT UNDER TORQUE SWITCH SPRING PRESSURE WHEN MOTOR IS DE-ENERGIZED.			
	SIZING	OPEN/CLOSE AT RATED SPEED AGAINST DESIGNED DIFFERENTIAL PRESSURE AT 85% OF RATED VOLTAGE. FOR ISOLATING SERVICE THREE SUCCESSIVE OPEN-CLOSE OPERATIONS OR 15 MINS. WHICHEVER IS HIGHER. FOR INCHING SERVICE - 150 STARTS/HR MINIMUM & FOR REGULATING SERVICE - 600 STARTS/HR MINIMUM.			
HANDWHEEL	* REQUIRED	☒ YES ☐ NO			
	* ORIENTATION	☐ TOP MOUNTED ☐ SIDE MOUNTED			
	*TO DISENGAGE AUTOMATICALLY DURING MOTOR OPERATION.				
ELECTRIC ACTUATOR	ACTUATOR MAKE/MODEL	BIDDER TO SPECIFY			
	MOTOR MAKE / MODEL / TYPE / RATING (KW)	BIDDER TO SPECIFY			
	@ MOTOR TYPE	SQUIRREL CAGE INDUCTION MOTOR, STARTING CURRENT LIMITED TO SIX TIMES THE RATED CURRENT- INCLUSIVE OF I.S. TOLERANCE			
	ACTUATOR APPLICABLE WIRING DIAGRAM	☐ ENCLOSED (BIDDER TO CONFIRM) A: ☐ DRG. NO. 3-V-MISC-24227 R00 B: ☐ DRG. NO. 3-V-MISC-24550 R00 C: ☐ DRG. NO. 3-V-MISC-24283 R00 D: ☐ DRG. NO. 4-V-MISC-90271 R11 E: ☐ For Thyristor based Integral starter, Bidder/Vendor to furnish wiring diagram			
	COLOUR SHADE	☐ BLUE (RAL 5012) ☐			
	PAINT TYPE (## Refer Notes)	☐ ENAMEL ☒ EPOXY ☐			
	SHAFT RPM	BIDDER TO SPECIFY			
	OLR SET VALUE	BIDDER TO SPECIFY			
	@ STARTING / FULL LOAD CURRENT	BIDDER TO SPECIFY			
	NO. OF REV FOR FULL TRAVEL	BIDDER TO SPECIFY			
	@ PWR SUPP TO MTR / STARTER	415V, 3PH, AC			
	@ CONTROL VOLTAGE REQUIREMENT	TO BE DERIVED FROM THE POWER SUPPLY TO THE STARTER ☐ 230 V ☐ 110 V			



**SPECIFICATION FOR
MOTORISED VALVE ACTUATOR
FOR SELF CLEANING STRAINERS
(APPLICABLE FOR TYPES- I TO V)**

SPECIFICATION NO.: PE-DG-XXX-145-I902

VOLUME II B

SECTION D

REV. NO.

00

DATE: 28.03.2017

SHEET

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OF

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Data Sheet A & B

DATA SHEET-A
(TO BE FILLED BY PURCHASER)

DATA SHEET-B
(TO BE FILLED-UP BY BIDDER)

	@ ENCLOSURE CLASS OF MOTOR	☒ IP 68 ☐ FLAME PROOF		
	@ INSULATION CLASS	CLASS-F TEMP. RISE LIMITED TO CLASS-B		
	@ WINDING TEMP PROTECTION	☒ THERMOSTAT (3 Nos.,1 IN EACH PHASE) ☐ -----		
	SINGLE PHASE / WRONG PHASE SEQUENCE PROTECTION	REQUIRED		
INTEGRAL STARTER	INTEGRAL STARTER	☒ REQUIRED ☐ NOT REQUIRED		
	TYPE OF SWITCHING DEVICE	☒ CONTACTORS ☐ THYRISTORS		
	TYPE	☒ CONVENTIONAL ☐ SMART (NON-INTRUSIVE)		
	STEP DOWN CONT. TRANSFORMER	☒ REQUIRED		
	OPEN / CLOSE PB	☒ REQUIRED ☐ NOT REQUIRED		
	STOP PB	☒ REQUIRED ☐ NOT REQUIRED		
	INDICATING LAMPS	☒ REQUIRED ☐ NOT REQUIRED		
	LOCAL REMOTE S/S	☒ REQUIRED ☐ NOT REQUIRED		
	STATUS CONTACTS FOR MONITORING	☒ REQUIRED ☐ NOT REQUIRED		
	INTEGRAL STARTER DISTURBED SIGNAL	REQUIRED (MOTOR THERMOSTAT TRIP , O/L RELAY OPERATED, CONT./POWER SUPPLY FAILED, PHASE LOSS, S/S IN LOCAL/ OFF MODE, STOP PB OPTD, TORQUE OPEN/CLOSE CUTOFF)		
INTERPOSING RELAY/OPTO COUPLER (Applicable for integral Starter)	TYPE OF ISOLATING DEVICE	☒ INTERPOSING RELAY ☒ OPTO COUPLER ☐ EITHER		
	QUANTITY	☒ 2 NOS. ☐ 3 NOS.		
	DRIVING VOLTAGE	☒ 20.5 – 24V DC ☐ _____ V DC		
	DRIVING CURRENT	☒ 125mA MAX ☐ _____ mA MAX		
	LOAD RESISTANCE	☒ > 192 ohms - <25 k ohms ☐ > _____ ohms - < _____ ohms		
TORQUE SWITCH (Not Applicable for Smart Actuator) (\$\$ Refer Notes)	MFR & MODEL NO.	BIDDER TO SPECIFY		
	OPEN / CLOSE	☒ 1 No. ☐ 2Nos. / ☒ 1 No. ☐ 2Nos		
	CONTACT TYPE	2 NO + 2 NC		
	RATING	5A 240V AC AND 0.5A 220V DC		
	CALIBRATED KNOBS(OPEN&CLOSE TS)	REQUIRED FOR SETTING DESIRED TORQUE		
	ACCURACY	+3% OF SET VALUE		
LIMIT SWITCH (Not Applicable for Smart Actuator) (\$\$ Refer Notes)	MFR & MODEL NO.	BIDDER TO SPECIFY		
	OPEN : INT : CLOSE	☐ 1 No ☒ 2 Nos.	2 Nos. (ADJ.)	☐ 1 No. ☒ 2Nos.
	CONTACT TYPE	2 NO + 2 NC		
	RATING (AC / DC)	5A 240V AC AND 0.5A 220V DC		



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POSITION TRANSMITTER	POSITION TRANSMITTER (For inching duty & other specific applications)	☒ REQUIRED ☐ NOT REQUIRED	
	MFR & MODEL NO.	BIDDER TO SPECIFY	
	TYPE	☐ ELECTRONIC (2 WIRE) R/I CONVERTER ☒ ELECTRONIC (2 WIRE) CONTACTLESS	
	SUPPLY	☒ 24V DC ☐	
	OUTPUT	☒ 4-20mA	
	ACCURACY	± 1% FS	
SPACE HEATER	@SPACE HEATER	REQUIRED	
	@ POWER SUPPLY (NON INTEGRAL)	☒ 230V AC,1 PH.,50 Hz ☒ 240V AC,1 PH.,50 Hz	
	@ POWER SUPPLY (INTEGRAL)	BIDDER TO SPECIFY	
	@ RATING		
TERMINAL BOX	ACTUATOR/MOTOR TERMINAL BOX	REQUIRED	
	ENCL CLASS ACTUATOR/MOTOR T.B.	@ ☒ IP 68 @ ☐	
	@ EARTHING TERMINAL	REQUIRED	
	PLUG & SOCKET (9 PIN/ 11 PIN) (FOR COMMD, LS/TS FEED BACK, PoT)	☒ REQUIRED ☐ NOT REQUIRED ☒ 2 NOS. ☐	
CABLE GLANDS	@ POWER CABLE GLAND	SIZE: suitable for 3Cx2.5sq mm Cu	
	@ SPACE HEATER CABLE GLAND		
	OTHER CONTROL CABLE GLANDS-1	1 no. for BFV of CW pump (Cable size 2Px1.5mm2)	
	OTHER CONTROL CABLE GLANDS-2	1 no. suitable for 8Px0.5 sq m Additional 1 no. suitable for 2P x 0.5 sq mm.	



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WEIGHT

TOTAL WEIGHT (ACTUATOR + ACCESSORIES)

BIDDER TO SPECIFY

_____ Kg.

NOTES:

1. **SCOPE:** DESIGN, MANUFACTURE, INSPECTION, TESTING AND DELIVERY TO SITE OF ELECTRIC ACTUATOR FOR INCHING OR OPEN / CLOSE DUTY.
 2. **CODES & STANDARDS:** DESIGN AND MATERIALS USED SHALL COMPLY WITH THE RELEVANT LATEST NATIONAL AND INTERNATIONAL STANDARD. AS A MINIMUM, THE FOLLOWING STANDARDS SHALL BE COMPLIED WITH:
IS-9334, IS-2147, IS-2148, IS-325, IS-2959, IS-4691 AND IS-4722
 3. **ACTUATOR SHALL HAVE HARDWIRED CONTACTS FOR FOLLOWING SIGNALS (a) ACTUATOR IN LOCAL MODE (b) ACTUATOR IN REMOTE MODE.**
 4. BIDDER TO ENSURE AVAILABILITY OF SPARE 1NO + 1NC LIMIT SWITCH & TORQUE SWITCH.
 5. SS TAG NAME PLATE SHALL BE PROVIDED.
 6. TEMPERATURE RISE SHALL BE RESTRICTED TO 70 DEG. C FOR AMBIENT TEMPERATURE OF 50 DEG C.
 7. CABLE GLANDS OF DOUBLE COMPRESSION TYPE, Ni PLATED BRASS MATERIAL SHALL BE PROVIDED.
 8. THE TORQUE SWITCHES SHALL BE PROVIDED WITH MECHANICAL LATCHING DEVICE TO PREVENT OPERATION WHEN UNSEATING FROM THE END POSITIONS. THE LATCHING DEVICE SHALL UNLATCH AS SOON AS THE VALVE LEAVES THE END POSITION. IF SUCH PROVISION IS NOT POSSIBLE, THE TORQUE SWITCHES SHALL BE BYPASSED BY END-POSITION LIMIT SWITCHES WHICH OPENS ON VALVE LEAVING END POSITION. THESE LIMIT SWITCHES ARE ADDITIONAL TO THE NUMBER OF LIMIT SWITCHES SPECIFIED ELSEWHERE.
 9. THE MOTOR SHALL OPERATE SATISFACTORILY UNDER THE +/- 10% SUPPLY VOLTAGE VARIATION AT RATED FREQUENCY, -5% TO +3% VARIATION IN FREQUENCY AT RATED SUPPLY VOLTAGE, SIMULTANEOUS VARIATION IN VOLTAGE & FREQUENCY THE SUM OF ABSOLUTE PERCENTAGE NOT EXCEEDING 10%.
 10. THE MOTOR SHALL BE SUITABLE FOR DIRECT ON LINE STARTING.
 11. IT SHOULD BE POSSIBLE TO OPERATE THE ACTUATOR LOCALLY. LOCKABLE LOCAL/REMOTE SELECTION SHALL BE PROVIDED ON THE ACTUATOR.
 12. POSITION INDICATOR SHALL BE PROVIDED FOR 0 TO 100 % TRAVEL
 13. WIRING SHALL BE SUITABLE VOLTAGE GRADE COPPER WIRE 1.5 SQ. MM.
 14. THE MOTOR SHALL BE CAPABLE OF STARTING AT 85 PERCENT OF RATED VOLTAGE AND RUNNING AT 80 PERCENT OF RATED VOLTAGE AT RATED TORQUE AND 85 PERCENT RATED VOLTAGE AT 33 PERCENT EXCESS RATED TORQUE FOR A PERIOD OF 5 MINUTES EACH.
 15. THE ACTUATORS SHALL BE DESIGNED TO BE SELF-LOCKING UPON LOSS OF POWER. MOTOR SHALL BE DESIGNED TO CLOSE IN 30 SECS. FROM FULL OPEN POSITION AND SHALL HAVE ADEQUATE CAPACITY TO OPEN AND CLOSE UNDER FULL UNBALANCED DESIGN PRESSURE.
 16. ALL SIX (6) LIMIT SWITCHES SHALL BE CHANGEOVER TYPE AND ADJUSTABLE BESIDES HAVING THE SNAP FACILITY.
 17. THE INTEGRAL STARTER WHICH SHALL HAVE SOPHISTICATED ELECTRONIC CONTROLS WITH FIELD PROGRAMMING FEATURE. IT SHALL BE DESIGNED FOR REMOTE CONTROL FROM DCS/RESPECTIVE CONTROL SYSTEM. REQUIRED INTERPOSING RELAYS FOR RECEIVING OPEN/CLOSE/STOP COMMAND FROM DCS/RESPECTIVE CONTROL SYSTEM SHALL BE PROVIDED. POTENTIAL FREE CONTACTS AND TRANSDUCERS SHALL BE PROVIDED TO PROVIDE STATUS INDICATION AT REMOTE DCS/RESPECTIVE CONTROL SYSTEM.
 18. THE REMOTE COMMAND SIGNAL (OPEN-STOP-CLOSE) FROM DCS/RESPECTIVE CONTROL SYSTEM/CONTROL PANEL SHALL BE ISOLATED FROM CONTROL ELECTRONICS THROUGH OPTO-ISOLATOR.
 19. THE FOLLOWING INDIVIDUAL STATUS ANNUNCIATION LED'S (COLOUR-GREEN) SHALL BE PROVIDED LOCALLY (INTEGRAL TO ACTUATOR) TO ANNUNCIATE THE FOLLOWING FOR EASY LOCAL MONITORING.

 ACTUATOR IN LOCAL MODE
 ACTUATOR IN REMOTE MODE
 ACTUATOR RUNNING IN OPEN DIRECTION
 ACTUATOR RUNNING IN CLOSE DIRECTION
 ACTUATOR IN INCHING MODE
 ACTUATOR IN SELF-RETAINING MODE
 LIMIT SWITCH OPEN TRIP
 LIMIT SWITCH CLOSE TRIP
 CONTROL VOLTAGE AVAILABILITY
- \$\$ TORQUE SWITCH & LIMIT SWITCH SHALL ACT INDEPENDENT OF EACH OTHER. TANDEM OPERATION IS NOT ACCEPTABLE.**
- ## EPOXY PAINT IS RECOMMENDED FOR COASTAL AREAS.**

	PREPARED BY	CHECKED BY	APPROVED BY	VENDOR COMPANY SEAL
NAME				NAME
SIGNATURE				SIGNATURE
DATE				DATE



**DATA SHEET FOR
LOCAL CONTROL CUM STARTER PANELS
FOR SELF CLEANING STRAINERS
(APPLICABLE FOR TYPES I TO V)**

SPECIFICATION NO.: PE-SS-999-145-054A

VOLUME

SECTION

REV. NO. 00 DATE: 28.03.2017

SHEET 1 OF 3

TAG No. Qty.....

Data Sheet No.: PES-145A-DS1-0

Data Sheet A & B

DATA SHEET-A FOR LOCAL PANEL
(TO BE FILLED BY PURCHASER)

DATA SHEET-B
(TO BE FILLED-UP BY
BIDDER)

GENERAL

MANUFACTURER

CONSTRUCTION

☒ FOLDED ☐ WELDED

ENCLOSURE SHEET THICKNESS

FRONT

☒ 3.0 mm

OTHER

☒ 2.0 mm

DOOR

☒ 2 mm

HEIGHT

☒ 2365 mm for stand-alone panels (THIS SHALL BE DECIDED BY BHEL DURING DETAILED ENGG.)

OTHER

☒ Load bearing sheet front shall have 3mm thickness**TECHNICAL**

INPUT POWER SUPPLY *

☐ 240V 50 Hz AC ☐ 220V DC

(ANY OTHER POWER REQUIREMENT TO BE DERIVED FROM THIS SUPPLY ONLY)

☒ 415V 3 PHASE

Kindly refer Electrical scope sheet

NO. OF FEEDERS

☐ ONE☒ TWO

STARTER WITH MCC

☒ REQUIRED☐ NOT REQUIRED

IPR POSITION

☐ MCC☒ CONTROL PANEL

CONTACT RATING OF RELAY

☒ 5 Amp, 230 V AC ☒ 0.25 Amp, 220V DC

CONTROL SUPPLY

☐ 10V AC☐ 220V AC☒ 220V DC☐ Other.

(As per requirement)

ALARM ANNUNCIATOR WINDOW
(EXCLUDING SPARES)
☒ REQUIRED 10 nos. Actual no. shall be decided during detailed engg.

TEMP SCANNER

(IF REQUIRED –NO. OF CHANNELS TO BE SPECIFIED UNDER SEC-C)

☐ REQUIRED☒ NOT REQUIRED

PAINT TYPE

☒ EPOXY ENAMEL☐ EPOXY POWDER COATED OR BETTER

MIMIC (TYPE OF MIMIC- MATERAIL, THICKNESS TO BE SPECIFIED DURING DETAILED ENGG.)

☒ REQUIRED☐ NOT REQUIRED

PANEL COLOUR (EXTERNAL)

☐ LIGHT GREY (Shade 631 IS-5)☐ OPALINE GREEN (Shade 275)☐ RAL 7032

SHALL BE DECIDED DURING DETAILED ENGINEERING

FINISH (EXTERNAL)

☐ MATT☐ GLOSSY☐ SEMI GLOSSY

PANEL COLOUR (INTERNAL)

☐ WHITE☐ CREAM☐ OFF WHITE

SHALL BE DECIDED DURING DETAILED ENGINEERING

FINISH (INTERNAL)

☐ MATT☒ GLOSSY☐ SEMI GLOSSY

SHALL BE DECIDED DURING DETAILED ENGINEERING



**DATA SHEET FOR
LOCAL CONTROL CUM STARTER PANELS
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SPECIFICATION NO.: PE-SS-999-145-054A

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TAG No. Qty.....

Data Sheet No.: **PES-145A-DS1-0**

Data Sheet A & B

DATA SHEET-A FOR LOCAL PANEL
(TO BE FILLED BY PURCHASER)

DATA SHEET-B
(TO BE FILLED-UP BY
BIDDER)

CLASS OF PROTECTION

☐ IP-66 (FOR OUTDOOR LOCATIONS)☒ IP-55 (FOR INDOOR LOCATIONS)

WITH A SUITABLE CANOPY AT THE TOP, TO BE DECIDED DURING DETAILED ENGG.

CONTROL HARDWARE

☐ RELAY BASED

FOUNDATION ARRANGEMENT

☐ FOUNDATION BOLTS ☐ ANCHOR FASTENERS

WEIGHT OF PANEL (Kg.)

.....(Vendor to specify)

PANEL TYPE

☐ PRESSURISED ☒ UNPRESSURISED

As per Requirement

CABLE GLAND

☒ DOUBLE COMPRESSION

AMMETER (TYPE OF INPUT)

☐ 1 Amp CT ☐ 4-20 Ma

NOT REQUIRED BELOW 30KW.

SCOPE OF SUPERVISION FOR
ERECTION & COMMISSIONING☐ APPLICABLE ☐ NA

NAME
DESIGNATION
SIGNATURE
DATE

PREPARED BY

CHECKED BY

APPROVED BY

COMPANY SEAL

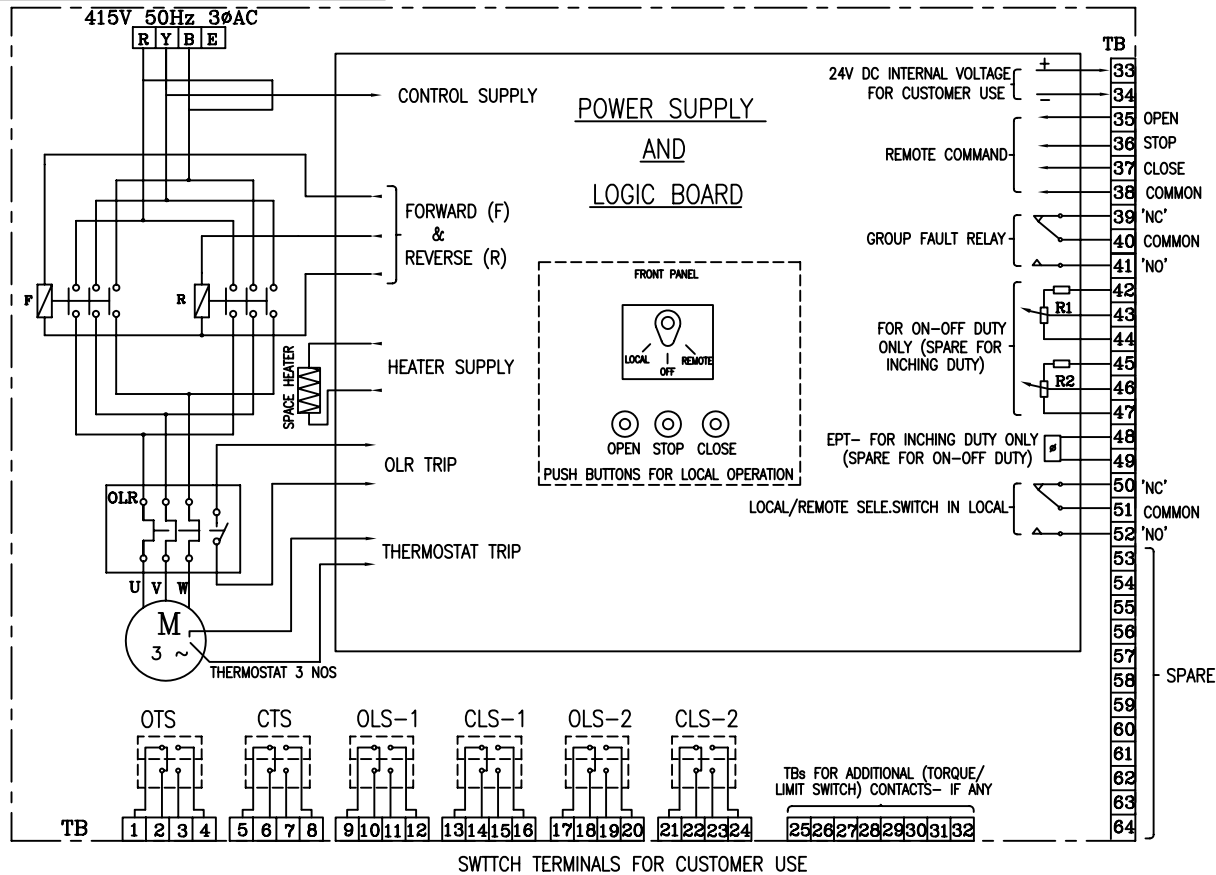
NAME:

SIGNATURE:

DATE:

3-V-MISC-24227

DRAWING NO.



CONTACT DEVELOPMENT DIAGRAM

OTS	1-2	OPEN AT OVER TORQUE DURING OPENING TRAVEL				
	3-4	CLOSE AT OVER TORQUE DURING OPENING TRAVEL				
CTS	5-6	OPEN AT OVER TORQUE DURING CLOSING TRAVEL				
	7-8	CLOSE AT OVER TORQUE DURING CLOSING TRAVEL				
OLS-1	9-10					
	11-12					
CLS-1	13-14					
	15-16					
OLS-2	17-18					
	19-20					
CLS-2	21-22					
	23-24					
SWITCH	TERMINAL NO.	FULL OPEN	a	INTERMEDIATE	b	FULL CLOSE
		VALVE POSITION				
 INDICATES CONTACT CLOSED						
 INDICATES CONTACT OPEN						
CONTACT RATING: 5A AT 250V AC & 0.5A AT 220V DC						

SETTING PROCEDURE OF POSITION LIMIT AND TORQUE SWITCH

VALVES	OPEN		CLOSE	
	MAIN	BACK UP	MAIN	BACK UP
GATE VALVE OF 100 mm AND ABOVE IN 1500 CL AND ABOVE RATINGS	OLS	OTS *	CLS	CTS
ALL OTHER GATE & GLOBE VALVES	OLS	OTS *	CTS	#
# - CLS NOT TO BE CONNECTED IN TRIP CIRCUIT				
* - BYPASS OTS FOR INITIAL 5% OF TRAVEL (FOR GATE VALVES ONLY)				

NOTE:-

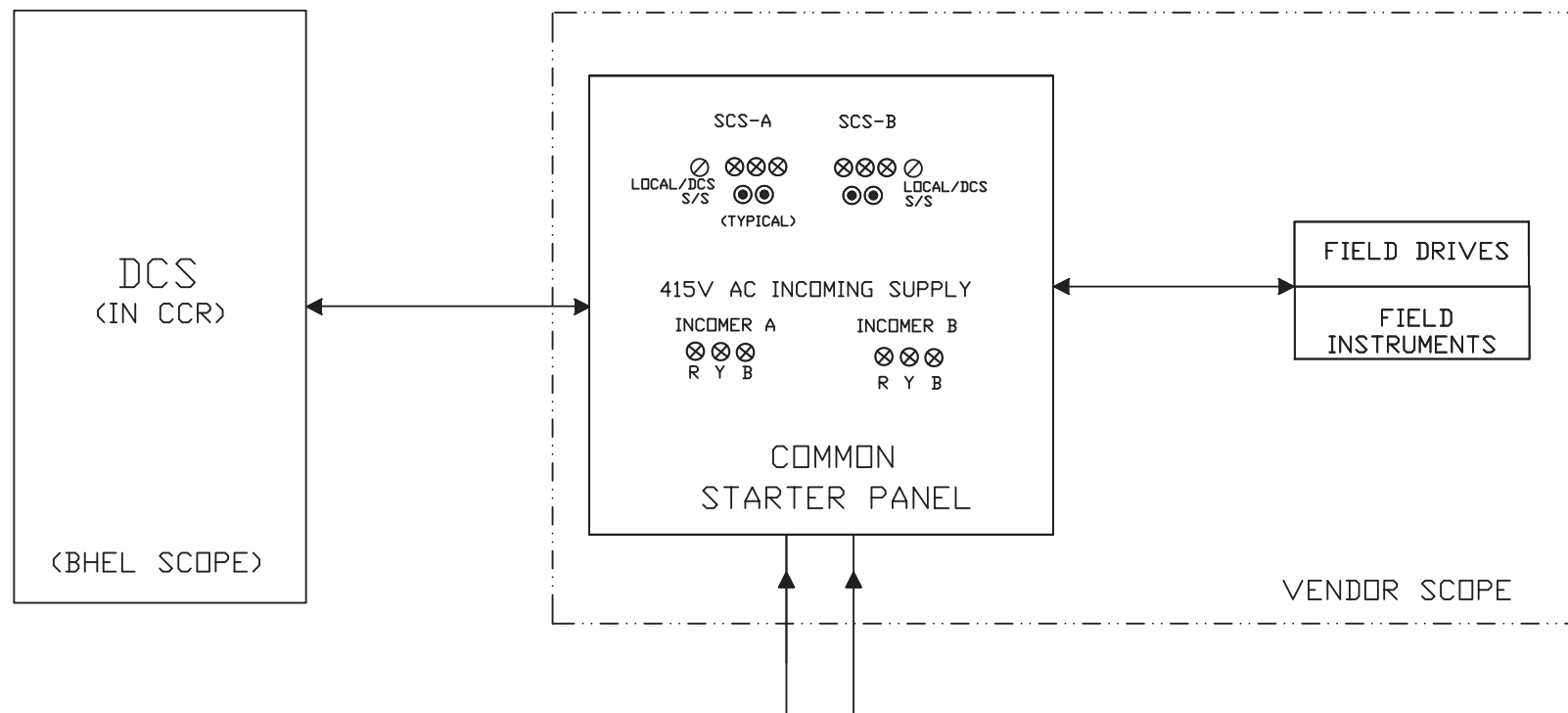
- ALL TORQUE AND LIMIT SWITCHES (OTS,CTS,OLS1&2, CLS1&2) ARE WITH 2NO+2NC CONTACTS '1NO+1NC' IS TERMINATED IN TBS 1-24, REMAINING CONTACTS ARE FOR INTERNAL USE.
ANY SPARE CONTACTS WHICH ARE NOT USED INTERNALLY ARE TO BE TERMINATED IN TBS 25-32
- CTS - TORQUE SWITCHES FOR CW ROTATION (CLOSE)
- OTS - TORQUE SWITCHES FOR CCW ROTATION (OPEN)
- OLS-1, OLS-2 - LIMITSWITCHES FOR POSITION OPEN
- CLS-1, CLS-2 - LIMITSWITCHES FOR POSITION CLOSE
- EPT - ELECTRONIC POSITION TRANSMITTER
(Contactless, FOR INCHING DUTY)
- R1-R2-POTENTIOMETER 2 x 100 OHMS (FOR ON-OFF DUTY)
- FOR COMMANDS & EPT EITHER INTERNALLY GENERATED 24 VDC OR EXTERNAL SUPPLY OF 24VDC CAN BE USED
- M - MOTOR 3 ϕ 415V 50 Hz AC SUPPLY

REV	DATE	ALTERED
		CHD & APPD

CAUTION: The information on this document 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		ELECTRICAL VALVE ACTUATORS (AC) WITH INTEGRAL STARTERS (DRAWN FOR INTERMEDIATE POSITION OF VALVES)				
 365-121 BHARAT HEAVY ELECTRICALS LTD., UNIT: HIGH PRESSURE BOILER PLANT. TIRUCHIRAPALLI-620014.		DRN	NAME N.P.ESWAR	SIGN N.P	DATE 07.10.04	NO.OF VAR.
		CHD	D.DINAKARAN	D.D	07.10.04	
		APPD	K.ARUNACHALAM	K.A	07.10.04	
DEPT VL		SCALE	WEIGHT (KG).	REFERENCE INFORMATIONS		NO. OF ITEMS
CODE						
TITLE WIRING DIAGRAM (TERMINAL PLAN) FOR ACTUATOR WITH INTEGRAL STARTER			CARD CODE U 01	DRAWING NO. 3-V-MISC-24227		REV 0

STANDARD BLOCK DIAGRAM FOR SCS PACKAGE WITH DCS



415V AC, 3P, 3WIRE
REDUNDANT FEEDER
(BY CUSTOMER/BHEL)

NOTE:-

1. COMMON LCP FOR L & R STREAM HOUSING PB , LAMPS ETC.
2. SIGNALS FOR FIELD INSTR. & FOR 'BID' DRIVES WITH INTEGRAL STARTER SHALL BE ROUTED TO DCS THROUGH STARTER PANEL.



TITLE:

**TECHNICAL SPECIFICATION
OF RATE CONTRACT
SELF CELAING STRAINER**

SPECIFIC TECHNICAL REQUIREMENTS

SPEC. NO.: **PE-TS-RC-165-N004**

SECTION: **I**

SUB-SECTION: **ID**

REV. NO. **0** DATE **24.03.2017**

SHEET **1** OF **1**

SUB-SECTION – ID

DATASHEET-A

			DATA SHEET - A	SPECIFICATION NO.: PE-TS-RC-165-N004
			SELF CLEANIGN STRAINER (SCS)	REV. NO.: 00. DATE : 24/03/2017
			FOR CLARIFIED WATER APLICATION	SECTION : I. SUB-SECTION : ID
SL NO	DESCRIPTION	UNITS	TYPE- I	TYPE- II
1.00	GENERAL			
1.1	No. of Strainers/ Filters required for station	Nos.	Total 2 Sets viz. (1 Working + 1 Standby)	Total 8 Sets for Total Station viz. i.e.(4Working + 4 Standby)
1.1	Liquid Handled		Clarified water (Refer enclosed water analysis at Annexure I)	Clarified water (Refer enclosed water analysis at Annexure I)
1.2	Size of SCS Shell	NB	600	600
1.3	Length of SCS Shell	mm	Max 2500 mm (including counter Flanges)	Max 2500 mm (including counter Flanges)
1.4	Scope of Counter Flange of SCS Shell		In bidder's scope	
1.5	BOQ for Debris Discharge Piping (For Clarified water).		1. Dia of pipe: To be decided by bidder. 2. Length of pipe: 50 m pipe length.3. No. of bends: 5 Nos.	1. Dia of pipe: To be decided by bidder. 2. Length of pipe: 50 m pipe length.3. No. of bends: 5 Nos.
1.6	Filter type/ duty		On line / continuous	On line / continuous
1.7	Location		ACW Pump Discharge Header (Outdoor)	ACW Pump Discharge Header (Outdoor)
2	DESIGN DATA			
2.1	Operating pressure at SCS Inlet Flange	kg/cm2 (g)	2	2 to 3
2.2	Design pressure for SCS Shell	kg/cm2 (g)	7.5	7.5
2.3	Design Mechanical temperature	Deg. C	60	60
2.4	Flow rate through filter			
	a) Normal	Cub m/Hr	2100-2300	2400-2600
	b) Maximum	Cub m/Hr	2520-2760	2880-3120
2.5	Design differential pressure for filter section/ screen	kg/cm2 (g)	1.5 (Min.)	1.5 (Min.)
2.6	Type of suspended matter likely to enter the filter		Typical debris encountered in closed circuit CW system with Cooling Tower	Typical debris encountered in closed circuit CW system with Cooling Tower
2.7	Differential pressure measuring system set pressure			
	• For initiating flushing/ backwashing	mbar	140	140
	• For alarm/ annunciation	mbar	170	170
2.8	Filter section/ screen perforation size	mm	2 mm (max)	2 mm (max)
2.9	Free flow area in the screen basket		Atleast 120 % of pipe inlet area	Atleast 120 % of pipe inlet area
2.1	Debris discharge flow during flushing period	Cub m/ Hr.	Not to exceed 3% of total flow rate	Not to exceed 3% of total flow rate
3	GUARANTEED PERFORMANCE REQUIREMENT			
3.1	Pressure drop across the filter (i.e. between inlet and outlet connection) at normal flow			
	a) Clean condition	mbar	100	100
	b) Partially (50%) chocked condition	mbar	140	140
4	MATERIALS OF CONSTRUCTION			

		DATA SHEET - A		SPECIFICATION NO.: PE-TS-RC-165-N004
		SELF CLEANIGN STRAINER (SCS)		REV. NO.: 00. DATE : 24/03/2017
		FOR CLARIFIED WATER APLICATION		SECTION : I. SUB-SECTION : ID
SL NO	DESCRIPTION	UNITS	TYPE- I	TYPE- II
4.1	Filter body/ housing		Carbon Steel to IS -2062 Gr. B. with epoxy painted inside (with minimum housing thickness same as connecting pipe thickness)	Carbon Steel to IS -2062 Gr. B. with epoxy painted inside (with minimum housing thickness same as connecting pipe thickness)
4.2	Connecting pipe (Inlet/ Outlet)		CS to IS 2062 Gr. B, rolled & butt welded, conforming to IS 3589	CS to IS 2062 Gr. B, rolled & butt welded, conforming to IS 3590
4.3	Filter screen/ section		SS 316	SS 316
4.4	Shaft		SS 316	SS 316
4.5	Supporting cage		SS 316	SS 316
4.6	Differential measuring system		SS 316	SS 316
4.7	Flushing/ backwashing unit		SS 316	SS 316
4.8	Backwash rotor shoes		Neoprene	Neoprene
4.9	Any other internal hardware /pipes etc.		SS 316	SS 316
4.1	Flushing Pump (If applicable)			
	a) Casing		CI to IS 210 FG 260	CI to IS 210 FG 260
	b) Impeller		SS-316	SS-316
	c) Shaft		SS-316	SS-316
4.11	Valves			
4.11.1	Check Valves (65 NB & Above)		For sizes 65 NB and above-Swing check type or dual plate type. End connection shall be flanged type.	For sizes 65 NB and above-Swing check type or dual plate type. End connection shall be flanged type.
	a) Body & Bonnet		Carbon Steel as per ASTM-A216-Gr. WCB.	SA216-WCB for Cast steel (Flanged Ends)
	b) Disc for Check Valve		SS-316	same as that of Body
	c) Stem		13% Cr Steel as per ASTM A-182 Gr. F6a	13% Cr Steel as per ASTM A-182 Gr. F6a
4.11.2	Check Valves (50 NB & Below)		For size 50 NB and below-Piston type End connection shall be socket welded type.	For size 50 NB and below-Piston type End connection shall be socket welded type.
	a) Body & Bonnet		Carbon steel as per ASTM A-105	SA105 for Forged steel. (Flanged Ends)
	b) Disc for Check Valve		SS-316	same as that of Body
	c) Stem		13% Cr Steel as per ASTM A-182 Gr. F6a.	13% Cr Steel as per ASTM A-182 Gr. F6a.
4.11.3	Gate/ Globe Valves 50 Nb & Below		End connection shall be socket welded type.	End connection shall be socket welded type.
	Body & Bonnet		Carbon steel as per ASTM A-105	IS 318 Gr. 2 / SA216-WCB for Cast steel/ SA105 for Forged steel.
4.11.4	Gate/Globe Valves (65NB & above)		End connection shall be flanged type.	
	➤ Body & Bonnet		Carbon Steel as per ASTM-A216-Gr. WCB.	
	➤ Disc		SS-316	
	➤ Stem		ASTM A-182 Gr. F6a	
4.11.5	BFV Valves (65NB & above)			
	➤ Body & Disc			SA216-WCB for Cast steel (Flanged Ends)

		DATA SHEET - A		SPECIFICATION NO.: PE-TS-RC-165-N004
		SELF CLEANIGN STRAINER (SCS)		REV. NO.: 00. DATE : 24/03/2017
		FOR CLARIFIED WATER APLICATION		SECTION : I. SUB-SECTION : ID
SL NO	DESCRIPTION	UNITS	TYPE- I	TYPE- II
	➤ Sealing, Retaining segment & internals			18 – 8 -SS
	➤ Bearing			Self Lubricating
	➤ Companinon Flange			IS 2062, Gr. B
4.11.6	Ball valves			
	i) Body		SA 351 CF8M	SA 351 CF8M
	ii) Ball		SA 351 CF8M	SA 351 CF8M
	iii) Stem		SS 316	SS 317
4.12	Debris discharge/ Interconnecting Piping material			
	MATERIAL		a) up to 150 NB - Carbon steel ERW, IS:1239 (Heavy Grade). b) 200 NB and above - CS to IS 2062 Gr. B, rolled & butt welded, conforming to IS 3589	a) up to 150 NB - Carbon steel ERW, IS:1239 (Heavy Grade). b) 200 NB and above - CS to IS 2062 Gr. B, rolled & butt welded, conforming to IS 3589
4.13	Inspection hole		Required	Required
5	COUNTER FLANGES FOR SCS SHELL		In Bidder's Scope	In Bidder's Scope
5.1	MATERIAL			
	a) Flanges		IS 2062, Gr. B, epoxy painted	IS 2062, Gr. B, epoxy painted
	b) Fasteners		A 193 & A 194	A 193 & A 195
	c) Gaskets		Min 4 mm thick rubber	Min 4 mm thick rubber
5.2	Drilling Standard		BS 4504 or equivalent	BS 4504 or equivalent
6	OTHER COUNTER FLANGES			
6.1	MATERIAL			
	a) Flanges		IS 2062, Gr. B, epoxy painted	IS 2062, Gr. B, epoxy painted
	b) Fasteners		A 193 & A 194	A 193 & A 195
	c) Gaskets		Min 4 mm thick rubber	Min 4 mm thick rubber
7	Material of Other components not specified above		Suitable for intended duty & water quality	Suitable for intended duty & water quality
8	Connecting pipe size (OD x Thk)	mm x mm	610 X 7.92	610 X 6.0
9	PAINTING			
9.1	External Surface			
	a) Surface preparation		SA 2.5 of Swedish Specification SIS 05.5900.197	SA 2.5 of Swedish Specification SIS 05.5900.197
	b) Primer		Two coats of HB chlorinated rubber based red oxide Zinc Phosphate, each 50 microns	Two coats of HB chlorinated rubber based red oxide Zinc Phosphate, each 50 microns
	c) Final paint		Two coats of chlorinated rubber based finish paint each 30 microns. To achieve total DFT of 175-200 microns	Two coats of chlorinated rubber based finish paint each 30 microns. To achieve total DFT of 175-200 microns
9.2	Internal Surface			
	a) Surface preparation		SA 2.5 of Swedish Specification SIS 05.5900.197	SA 2.5 of Swedish Specification SIS 05.5900.197
	b) Primer		One coat of epoxy resin based primer	One coat of epoxy resin based primer

		DATA SHEET - A		SPECIFICATION NO.: PE-TS-RC-165-N004
		SELF CLEANIGN STRAINER (SCS)		REV. NO.: 00. DATE : 24/03/2017
		FOR CLARIFIED WATER APLICATION		SECTION : I. SUB-SECTION : ID
SL NO	DESCRIPTION	UNITS	TYPE- I	TYPE- II
	c) Final paint		Applicable no. Of coats of coal tar epoxy paint to achieve total DFT of 250 microns	Applicable no. Of coats of coal tar epoxy paint to achieve total DFT of 250 microns
10	SHOP TEST			
10.1	Hydrostatic test			
	a) Test Pressure	bar (g)	1.5 times design pressure	1.5 times design pressure
	b) Test duration	min.	30	30
10.2	Leakage test			
	a) Test Pressure	bar (g)	Design Pressure	Design Pressure
	b) Test duration	min.	30	30
11	Adequate provision for future installation of cathodic protection required		YES	YES
12	Whether automatic flushing/ back- washing operation effected by the following :			
	i. Differential pressure		YES	YES
	ii. Adjustable timer		YES	YES
	iii. Push button		YES	YES
13	Whether provision for manual flushing / backwashing operation is made in the event of control system failure.		YES (if required)	YES (if required)
14	Whether built in flushing arrangement complete with flushing pump, valves, and associated piping, is provided.		YES (if required)	YES (if required)
15	MANDATORY SPARES - to be supplied under this specification –		List is attached in Annexure-III . Scope of supply as per Price schedule	



DATA SHEET - A					SPECIFICATION NO.: PE-TS-RC-165-N004
SELF CLEANIGN STRAINER (SCS)					REV. NO.: 00. DATE : 24/03/2017
FOR SEA WATER APLICATION					SECTION : I. SUB-SECTION : ID
SL NO	DESCRIPTION	UNITS	TYPE- III	TYPE-IV	TYPE- V
1.00	GENERAL				
1.1	No. of Strainers/ Filters required for station	Nos.	Total 2 Sets viz. (1 Working + 1 Standby)	Total 4 Sets for Total Station viz. i.e.(2 Working + 2 Standby)	Total 2 Sets for Total Station viz. i.e.(1 Working + 1 Standby)
1.1	Liquid Handled		Sea water (Refer enclosed water analysis at Annexure I)	Sea water (Refer enclosed water analysis at Annexure II)	Sea water (Refer enclosed water analysis at Annexure I)
1.2	Size of SCS Shell	NB	700	800	800
1.3	Length of SCS Shell	mm	Max 2500 mm (including counter Flanges)	Max 2500 mm (including counter Flanges)	Max 2500 mm (including counter Flanges)
1.4	Scope of Counter Flange of SCS Shell		In Bidder's scope	In Bidder's scope	In Bidder's scope
1.5	BOQ for Debris Discharge Piping (For Sea water).		1. Dia of pipe: To be decided by bidder. (Refer Cl no- 3.2.1 of sub section- IA) Debris Discharge Pipe shall be connected to CW outlet header	1. Dia of pipe: To be decided by bidder. (Refer Cl no- 3.2.1 of sub section- IA)	1. Dia of pipe: To be decided by bidder. (Refer Cl no- 3.2.1 of sub section- IA)
1.6	Filter type/ duty				
1.7	Filter type/ duty		On line / continuous	On line / continuous	On line / continuous
1.8	Location		ACW Pump suction Header (Outdoor)	ACW Pump Discharge Header (Outdoor)	ACW Pump Discharge Header (Outdoor)
2	DESIGN DATA				
2.1	Operating pressure at SCS Inlet Flange	kg/cm2 (g)	2	2 to 3	2 to 3
2.2	Design pressure for SCS Shell	kg/cm2 (g)	7.5	8	10
2.3	Design Mechanical temperature	Deg. C	60	60	60
2.4	Flow rate through filter				
	a) Normal	Cub m/Hr	3100-3400	4200-4500	3500-4100
	b) Maximum	Cub m/Hr	3720-4080	4620-5400	4200-4920
2.5	Design differential pressure for filter section/ screen	kg/cm2 (g)	1.5 (Min.)	1.5 (Min.)	1.5 (Min.)
2.6	Type of suspended matter likely to enter the filter		Typical debris encountered in closed circuit CW system with Cooling Tower	Typical debris encountered in closed circuit CW system with Cooling Tower	Typical debris encountered in closed circuit CW system with Cooling Tower
2.7	Differential pressure measuring system set pressure				
	• For initiating flushing/ backwashing	mbar	140	140	140
	• For alarm/ annunciation	mbar	170	170	170
2.8	Filter section/ screen perforation size	mm	2 mm (max)	2 mm (max)	2 mm (max)
2.9	Free flow area in the screen basket		Atleast 120 % of pipe inlet area	Atleast 120 % of pipe inlet area	Atleast 120 % of pipe inlet area
2.1	Debris discharge flow during flushing period	Cub m/ Hr	Not to exceed 3% of total flow rate	Not to exceed 3% of total flow rate	Not to exceed 3% of total flow rate
3	GUARANTEED PERFORMANCE REQUIREMENT				
3.1	Pressure drop across the filter (i.e. between inlet and outlet connection) at normal flow				
	a) Clean condition	mbar	100	100	100
	b) Partially (50%) chocked condition	mbar	140	140	140
4	MATERIALS OF CONSTRUCTION				
4.1	Filter body/ housing		Carbon Steel to IS 2062 with internal Rubber Lining.	Duplex SS	SS 316 L



DATA SHEET - A

SPECIFICATION NO.: PE-TS-RC-165-N004

SELF CLEANIGN STRAINER (SCS)

REV. NO.: 00. DATE : 24/03/2017

FOR SEA WATER APLICATION

SECTION : I. SUB-SECTION : ID

SL NO	DESCRIPTION	UNITS	TYPE- III	TYPE-IV	TYPE- V
4.2	Connecting pipe (Inlet/ Outlet)		Carbon Steel to IS 2062 with internal PU (Polyurethane) coating.	Carbon Steel to IS 2062 with internal PU (Polyurethane)/Polyurea /corrocaot	Carbon Steel to IS 2062 with internal Polyurea/corrocaot
4.3	Filter screen/ section		Duplex SS	Duplex SS	Duplex SS (UNS 32205/31803)
4.4	Shaft		Duplex SS	Duplex SS	Duplex SS (UNS 32205/31803)
4.5	Supporting cage		Duplex SS	Duplex SS	Duplex SS (UNS 32205/31803)
4.6	Differential measuring system		Duplex SS	Duplex SS	Duplex SS (UNS 32205/31803)
4.7	Flushing/ backwashing unit		Duplex SS	Duplex SS	Duplex SS (UNS 32205/31803)
4.8	Backwash rotor shoes		Neoprene	Neoprene	Neoprene
4.9	Any other internal hardware /pipes etc.		Duplex SS	Duplex SS	Duplex SS (UNS 32205/31803)
4.1	Flushing Pump (If applicable)				
	a) Casing		Duplex SS	Duplex SS	Duplex SS
	b) Impeller		Duplex SS	Duplex SS	Duplex SS
	c) Shaft		Duplex SS	Duplex SS	Duplex SS
4.11	Valves				
4.11.1	Check Valves (65 NB & Above)		For sizes 65 NB and above-Swing check type or dual plate type. End connection shall be flanged type.		
	a) Body & Bonnet		DI to ASTM-A-439 Grade D2 or Duplex SS	Duplex SS	Duplex SS
	b) Disc for Check Valve		DI to ASTM-A-439 Grade D2 or Duplex SS	Duplex SS	Duplex SS
	c) Stem		DI to ASTM-A-439 Grade D2 or Duplex SS	Duplex SS	Duplex SS
4.11.2	Check Valves (50 NB & Below)		For size 50 NB and below-Piston type End connection shall be socket welded type.		
	a) Body & Bonnet		DI to ASTM-A-439 Grade D2 or Duplex SS	Duplex SS	Duplex SS
	b) Disc for Check Valve		DI to ASTM-A-439 Grade D2 or Duplex SS	Duplex SS	Duplex SS
	c) Stem		DI to ASTM-A-439 Grade D2 or Duplex SS	Duplex SS	Duplex SS
4.11.3	Gate/ Globe Valves 50 Nb & Below				
	Body & Bonnet		DI to ASTM-A-439 Grade D2 or Duplex SS	Duplex SS, Screwed Ends	Duplex SS, Screwed Ends
4.11.4	Gate/Globe Valves (65NB & above)		End connection shall be flanged type.		
	➤ Body & Bonnet		DI to ASTM-A-439 Grade D2 or Duplex SS	Duplex SS	Duplex SS
	➤ Disc		DI to ASTM-A-439 Grade D2 or Duplex SS	Duplex SS	Duplex SS
	➤ Stem		DI to ASTM-A-439 Grade D2 or Duplex SS	Duplex SS	Duplex SS
	➤ Companinon Flange		Carbon Steel to IS 2062 with internal Rubber Lining.	Same as PIPE MOC	Same as Connecting PIPE MOC
4.11.5	BFV Valves (65NB & above)		NA		
	➤ Body & Disc		NA	Duplex SS	Duplex SS
	➤ Sealing, Retaining segment & internals		NA	Duplex SS	Duplex SS
	➤ Bearing		NA	Duplex SS	Duplex SS
	➤ Companinon Flange		NA	Same as PIPE MOC	Same as PIPE MOC
4.11.6	Ball valves				
	i) Body		DI to ASTM-A-439 Grade D2 or Duplex SS	Duplex SS	Duplex SS
	ii) Ball		DI to ASTM-A-439 Grade D2 or Duplex SS	Duplex SS	Duplex SS
	iii) Stem		DI to ASTM-A-439 Grade D2 or Duplex SS	Duplex SS	Duplex SS



DATA SHEET - A					SPECIFICATION NO.: PE-TS-RC-165-N004
SELF CLEANIGN STRAINER (SCS)					REV. NO.: 00. DATE : 24/03/2017
FOR SEA WATER APLICATION					SECTION : I. SUB-SECTION : ID
SL NO	DESCRIPTION	UNITS	TYPE- III	TYPE-IV	TYPE- V
4.12	Debris discharge/ Interconnecting Piping material		In Purchaser's Scope	In Purchaser's Scope	In Purchaser's Scope
	MATERIAL		a) Up to 300 NB - Duplex SS/ SS 316 L b) 350 NB and above - Carbon Steel to IS 2062 with internal PU (Polyurethane).	a) Up to 300 NB - Duplex SS (AS PER SCH 40S FOR PIPE UPTO 50 NB & SCH 10S FOR PIPE SIZE ABOVE 50 NB) b) 350 NB and above - Carbon Steel to IS 2062 with internal PU (Polyurethane)/Polyurea /corrocaot	a) Up to 300 NB - Duplex SS (AS PER SCH 40S FOR PIPE UPTO 50 NB & SCH 10S FOR PIPE SIZE ABOVE 50 NB) b) 350 NB and above - Carbon Steel to IS 2062 with internal Polyurea /corrocaot with a DFT of 2000 micron.
4.13	Inspection hole		Required	Required	Required
5	COUNTER FLANGES FOR SCS SHELL		In Bidder's Scope	In Bidder's Scope	In Bidder's Scope
5.1	MATERIAL				
	a) Flanges		Carbon Steel to IS 2062 with internal PU (Polyurethane) coating.	Same as Connecting Pipe MOC	Same as Connecting Pipe MOC
	b) Fasteners		SS 316 L	SS 316 L	SS 316 L
	c) Gaskets		Min 4 mm thick rubber	Min 4 mm thick rubber	Min 4 mm thick rubber
5.2	Drilling Standard		BS 4504 or equivalent	BS 4504 or equivalent	BS 4504 or equivalent
6	OTHER COUNTER FLANGES				
6.1	MATERIAL				
	a) Flanges		Carbon Steel to IS 2062 with internal PU (Polyurethane) coating.	Same as Connecting Pipe MOC	
	b) Fasteners		SS 316 L	SS 316 L	SS 316 L
	c) Gaskets		Min 4 mm thick rubber	Min 4 mm thick rubber	Min 4 mm thick rubber
7	Material of Other components not specified above		Suitable for intended duty & water quality	Suitable for intended duty & water quality	Suitable for intended duty & water quality
8	Connecting pipe size (OD x Thk)	mm x mm	711 X 7.0	813 X 10.0	813 X 10.0
9	PAINTING			NA	NA
9.1	External Surface				
	a) Surface preparation		SA 2.5 of Swedish Specification SIS 05.5900.197		
	b) Primer		Two coats of HB chlorinated rubber based red oxide Zinc Phosphate, each 50 microns		
	c) Final paint		Two coats of chlorinated rubber based finish paint each 30 microns. To achieve total DFT of 160 microns		
9.2	Internal Surface		NA	NA	NA
	a) Surface preparation				
	b) Primer				
	c) Final paint				
10	SHOP TEST				
10.1	Hydrostatic test				
	a) Test Pressure	bar (g)	1.5 times design pressure	1.5 times design pressure	1.5 times design pressure
	b) Test duration	min.	30	30	30
10.2	Leakage test				
	a) Test Pressure	bar (g)	Design Pressure	Design Pressure	Design Pressure
	b) Test duration	min.	30	30	30



DATA SHEET - A					SPECIFICATION NO.: PE-TS-RC-165-N004
SELF CLEANIGN STRAINER (SCS)					REV. NO.: 00. DATE : 24/03/2017
FOR SEA WATER APLICATION					SECTION : I. SUB-SECTION : ID
SL NO	DESCRIPTION	UNITS	TYPE- III	TYPE-IV	TYPE- V
11	Adequate provision for future installation of cathodic protection required		YES	YES	YES
12	Whether automatic flushing/ back- washing operation effected by the following :				
	i. Differential pressure		YES	YES	YES
	ii. Adjustable timer		YES	YES	YES
	iii. Push button		YES	YES	YES
13	Whether provision for manual flushing / backwashing operation is made in the event of control system failure.		YES (if required)	YES (if required)	YES (if required)
14	Whether built in flushing arrangement complete with flushing pump, valves, and associated piping, is provided.		YES (if required)	YES (if required)	YES (if required)
15	MANDATORY SPARES - to be supplied under this specification –		List is attached in Annexure-III . Scope of supply as per Price schedule		

Annexure-I TYPE-I

Water analysis report

S. No.	Parameter	Circulating water analysis considering COC 5
1	PH	7.5 – 8.0 (max.)
2	K (as such)	800 ppm
3	Turbidity (NTU)	50 NTU
4	Sio2 (as such)	105 ppm
5	P-alk	NT
6	M alk (as such)	340 ppm
7	TH (as CaCO3)	470 ppm
7.1	CO3 (as such)	10.40 ppm
7.2	HCO3 (as such)	826.15 ppm
8	CaH (as CaCO3)	300 ppm
9	MgH (as CaCO3)	170 ppm
10	EMA (as CaCO3)	170 ppm
11	CL- (as CaCO3)	150 ppm
12	SO4 (as CaCO3)	20 ppm
13	Fe (as such)	0.5 ppm
14	KMnO4	--
15	RCI2	TR
16	TDS	1924.2 ppm

ANNEXURE-I TYPE -- II

TEST REPORT BY ENVIRONMENT SUB DIVISION

1. Sample Name : GODAVARI RIVER WATER
2. Location : AT MANUGURU
3. Sampling date : 09-10-2014.
4. Reporting date : 10-10-2014.

S.NO	TESTING PARAMETER	RESULT
1.	pH	7.73
2.	Conductivity(micro Siemens/cm)	328
3.	Dissolved solids(mg/litre)	218
4.	Total Hardness as CaCO ₃ , mg/litre	94
5.	Calcium as Ca, mg/litre	60
6.	Magnesium as Mg,mg/litre	34
7.	Total Alkanity as CaCO ₃ , mg/litre	140
8.	Chlorides as Cl, mg/litre	30
9.	Sulphates as SO ₄ ,mg/litre	58
10.	Silica as SiO ₂ ,mg/litre	5.20
11.	Iron as Fe,mg/litre	0.007
12.	Turbidity (NTU)	16

[Signature]
10/10/14
CHEMIST/ENV.SUB.DVN

1. 11/10/14
sc/c

CLARIFIED WATER ANALYSIS WITH COC OF 5.

ANNEXURE--I
WATER ANALYSIS - TYPE-IV

SEA WATER ANALYSIS

S.No.	Parameter	Unit	Value (Range)
1	General		
a	pH		7.94-8
b	Conductivity	millisiemens/cm	43.8-44.1
c	Temperature	Deg C	25-32
d	Turbidity	NTU	20-40
e	Total Organic carbon (total/ dissolved)	PPM of C	2.4-2.84
f	CO ₂	Mg/l	<2
g	TDS	Mg/l	39600-39740
h	BOD	Mg/l	10-12
i	COD	Mg/l	88-96
j	Oil & Grease	Mg/l	<10
k	Phenols	Mg/l	0.08-0.09
l	Free Residual Chlorine	Mg/l	<0.2
2	Cations		
a	Calcium	Mg/l	459-478
b	Magnesium	Mg/l	1510-1516
c	Sodium	Mg/l	10100-12000
d	Potassium	Mg/l	358-450
e	Ammonia	Mg/l	4.43-5.42
f	Strontium	Mg/l	12.9-12.4
g	Barium	Mg/l	1.55-1.58
h	Aluminum Total	Mg/l	1-1.8
i	Aluminum Dissolved	Mg/l	0.8-1.0
j	Manganese Total	Micro g/l	0.2-0.6
k	Manganese Dissolved	Micro g/l	0.1-0.2
l	Iron total	Micro g/l	220-260
m	Iron Dissolved	Micro g/l	Below detectable limit (detectable Limit : 10)
3	Anions		
a	Chloride	Mg/l	18994-19194
b	Sulphate	Mg/l	3710-3949
c	Nitrate	Mg/l	136-152
d	Nitrite	Mg/l	0.46-0.62
e	Bicarbonate	Mg/l	144-148
f	Carbonate	Mg/l	Nil
g	Fluoride	Mg/l	2.64-2.8
h	Boron	Mg/l	0.14-0.17
i	Phosphate	Micro g/l	240-380
j	Sulphide	Micro g/l	Below detectable limit (detectable Limit : 100)
k	Silica Dissolved	Micro g/l as SiO ₂	200-250
4	Heavy Metals		
A	Arsenic	Micro g/l	Below detectable limit (detectable Limit : 2)
B	Mercury	Micro g/l	Below detectable limit (detectable Limit : 1)
C	Cadmium	Micro g/l	120-130
D	Copper	Micro g/l	200-220
E	Nickel	Micro g/l	470-490
F	Molybdenum	Micro g/l	Below detectable limit (detectable Limit : 100)

ANNEXURE- I
WATER ANALYSIS -- TYPE- V

SEA WATER ANALYSIS

S.No.	Parameter	Unit	Value (Range)
1	General		
a)	pH		7.94-8
b)	Conductivity	millisiemens/cm	43.8-44.1
c)	Temperature	Deg C	25-32
d)	Turbidity	NTU	20-40
e)	Total Organic carbon (total/ dissolved)	PPM of C	2.4-2.84
f)	CO ₂	Mg/l	<2
g)	TDS	Mg/l	39600-39740
h)	BOD	Mg/l	10-20
i)	COD	Mg/l	88-96
j)	Oil & Grease	Mg/l	<10
k)	Phenols	Mg/l	0.08-0.09
l)	Free Residual Chlorine	Mg/l	<0.2
2	Cations		
a)	Calcium	Mg/l	459-478
b)	Magnesium	Mg/l	1510-1516
c)	Sodium	Mg/l	10100-12000
d)	Potassium	Mg/l	358-450
e)	Ammonia	Mg/l	4.43-5.42
f)	Strontium	Mg/l	12.9-12.4
g)	Barium	Mg/l	1.55-1.58
h)	Aluminum Total	Mg/l	1-1.8
i)	Aluminum Dissolved	Mg/l	0.8-1.0
j)	Manganese Total	Micro g/l	0.2-0.6
k)	Manganese Dissolved	Micro g/l	0.1-0.2
l)	Iron total	Micro g/l	220-260
m)	Iron Dissolved	Micro g/l	Below detectable limit (detectable Limit : 10)
3	Anions		
a)	Chloride	Mg/l	18994-19194
b)	Sulphate	Mg/l	3710-3949
c)	Nitrate	Mg/l	136-152
d)	Nitrite	Mg/l	0.46-0.62
e)	Bicarbonate	Mg/l	144-148
f)	Carbonate	Mg/l	Nil
g)	Fluoride	Mg/l	2.64-2.8

ANNEXURE- I
WATER ANALYSIS -- TYPE- V

h)	Boron	Mg/l	0.14-0.17
i)	Phosphate	Micro g/l	240-380
j)	Sulphide	Micro g/l	Below detectable limit (detectable Limit : 100)
k)	Silica Dissolved	Micro g/l as SiO ₂	200-250
4	Heavy Metals		
a)	Arsenic	Micro g/l	Below detectable limit (detectable Limit : 2)
b)	Mercury	Micro g/l	Below detectable limit (detectable Limit : 1)
c)	Cadmium	Micro g/l	120-130
d)	Copper	Micro g/l	200-220
e)	Nickel	Micro g/l	470-490
f)	Molybdenum	Micro g/l	Below detectable limit (detectable Limit : 100)
5	Suspended Particle Size Range		
a)	10 micron & above	Mg/l	Below detectable limit (detectable Limit : 10)
b)	5 micron to 10 micron	Mg/l	Below detectable limit (detectable Limit : 10)
c)	1 micron to 5 micron	Mg/l	Below detectable limit (detectable Limit : 10)
d)	0.1 micron to 1 micron	Mg/l	20-26
6	Colloidal Particle Size Range		
a)	SDI (10 Minutes)	-	10-20
b)	SDI (5 Minutes)	-	20-40
7	Density of sea water	Kg/ cum	1030

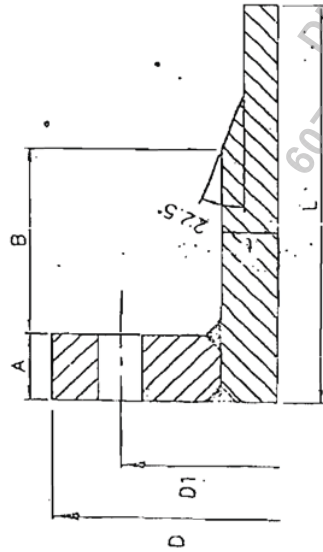
COC- 1.3

Annexure-II

ALL DIMENSIONS ARE IN MM

FIRST ANGLE PROJECTION

710M-14-666-DG-3D-M017



NOTES:-

Flange thicknesses listed are for Design pressure=5Kg/cm²(g) and Flange dimensions as given in the table. Final thickness of the flange is to be checked for actual OD/Bolting PCD/Neck dimensions.

PIPE SIZE	PIPE THK.	FLANGE OD 'D'	Bolt PCD 'D1'	FLANGE THK. 'A'	WELD NECK THK. 't'	NECK Length 'L'	WELD NECK FLANGE THK. 'B'	SLIP-ON FLANGE THICKNESS
1200	10-12	11465	1380	40	24	70	200	90
1400	14	1675	1590	50	24	70	200	100
1600	14	1915	1920	60	32	80	220	110
1800	14-16	2115	2020	70	32	90	250	120
2200	18	2550	2420	80	36	100	300	140
2300	20			90	38	110	325	150
2500	20			90	38	110	325	150
2700	20			90	38	110	325	150

— TENTATIVE

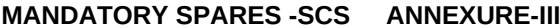
DRAWING FOR BAI' SEPARATOR COUNTER FLANGE

REV.	DATE	ALT.	CHG.	APPD.	JOB NO.	999
				STATUS:		
				DISTRIBUTION		
SHARAT HEAVY ELECTRICALS LTD POWER GROUP PROJECTS ENGINEERING MANAGEMENT PPEL, NOIDA TITLE COUNTER FLANGE DETAILS						
ISCT CODE DRX PSM CAB APPD NAME PA SPV SN SIGN DATE PSM PSM PSM				DRWING NO. PE-DG-999-141-M017 SHEET 01 OF 01 REV 00		



MANDATORY SPARES -SCS ANNEXURE-III

Sl. No	DESCRIPTION OF EQUIPMENT / ITEM Spares to be supplied under this specification.	DESCRIPTION OF UNIT OF MEASUREMENT	UOM	TYPE - I	TYPE - II	TYPE - III	TYPE - IV	TYPE - V
1	2	3	4	5	6	7	8	9
1.0	Mandatory Spares for Electronic Transmitters (for pressure ,) and Electrical Transducers.							
1.1	Transmitters and Electrical Transducers (10% of total number of offered for each model and type for the project or a minimum of one number, whichever is more)	Numbers=Nos.	Nos.	1	2	1	1	1
2.0	Mandatory spares for local gauges (for Pressure, DPG,)							
2.1	Local gauges/ Switch (for Pressure, DP, Temperature, Flow, level , etc.) (10% of total number of instruments offered for each model and type for the project or a minimum of one number, whichever is more.)	Numbers=Nos.	Nos.	1	2	1	1	1
2.3	Mandatory Spares for Control Panels / Desks							
2.3.1	Crimping pins	Roll	Roll	1	2	1	1	1
2.3.2	Bulbs for indicating Lights (Three times. the One hundred percent replacement)	Lot	Lot	1	2	1	1	1
2.3.3	Control circuit fuses for each current rating (Three times. the One hundred percent replacement)	Lot	Lot	1	2	1	1	1
2.3.4	Push Button , electrical control switches and push buttons etc.	(20 % qty Installed of each type of SCS= 1 Lot)	Lot	1	2	1	1	1
3.0	415 V Motor							
3.1	Terminal plates	(10 Nos. each for small motors upto 30 kW = 1 Lot)	Nos.	1	1	1	2	1
3.2	Heaters	(2set for each Type of SCS= 1 lot)	set	1	1	1	2	1
3.3	Greasing arrangements	4 set of each type of motor = 1 lot)	set	1	1	1	2	1
3.4	Motor of each type and rating	(10% qty Installed or minm 1 no whichever higher of each type of SCS= 1 Lot)	Lot	1	1	1	2	1
3.5	Bearings (DE and NDE) for each type and rating of motor	4 set of each type of SCS = 1 lot)	Set	1	1	1	2	1
4.0	C&I Spares						2	1
4.1	Each type of lamps, PBs, ILPBs, fuse, MCB, MCCB used in the equipment/system.	(20%) installed of each type for each type of SCS.= 1 LOT)	Lot	1	1	1	2	1
4.2	Measuring Instruments - Indicators,Recorders, Electrical Metering and Skid Mounted Instruments						2	1
4.2.1	Indicators, recorders and meters offered from each model for the project. These instruments shall be supplied with three sets of blank scales.	(10% of installed of each type/Model or minimum of one no for each model and type for each type of SCS = 1LOT)	Lot	1	1	1	2	1
4.2.2	Skid mounted instruments (if any)	(10% of total no. of instruments for each model or minimum one no for each model and type whichever is more for each type of SCS.= 1 LOT)		1	1	1	2	1
4.3.3	Temperature, Transmitters and Electronic Transmitters (For Pressure, DP, Temp, Flow, Level), Temperature, Pressure, Flow & Level Switch, safety switches, Gauges, meters, Transducer or any other instrument etc.	(10% of total number of Instruments/transducers offered for each model and type for each type of SCS, whichever is more = 1 Lot)	Lot	1	1	1	2	1
4.4	Relay based Control Panels							
4.4.1	LEDs for indicating lights	(10% qty installe for each type of SCS= 1 Lot)	Lot	1	1	1	2	1



	DESCRIPTION OF EQUIPMENT / ITEM	DESCRIPTION OF UNIT OF MEASUREMENT	UOM	TYPE - I	TYPE - II	TYPE - III	TYPE - IV	TYPE - V
Sl. No	Spares to be supplied under this specification.							
1	2	3	4	5	6	7	8	9
4.4.2	Control circuit fuses/MCB/MCCB	(Three Times, 300% of installed of each current rating for each Type of SCS.= 1 Lot)	Lot	1	1	1	2	1
4.4.3	Relays modules & contactors.	(20% qty Installed of each type of SCS= 1 Lot)	Lot	1	1	1	2	1
4.5	Alarm Annunciation System						2	1
4.5.1	logic modules, group card modules, power supply modules, Hooters and any other electronic module.	(20% for each type Installed for each type of SCS= 1 Lot)	Lot	1	1	1	2	1
4.5.2	un-engraved window boxes complete with LED etc.	(5% spares of each type Installed for each Type of SCS= 1 Lot)	Lot	1	1	1	2	1
4.5.3	LEDs for annunciation facia windows and LEDs box assemblies offered for the project	(20% qty Installed for each type of SCS= 1 Lot)	Lot	1	1	1	2	1
4.5.4	Annunciator hooter	one (1) No of each Type of SCS =Nos.		1	1	1	2	1
4.6	Erection Hardware							
4.6.1	Instrument valves, manifold for each type, rating, model number and size of devices supplied for the project	(10% qty Installed of each Type & Size for each type of SCS= 1 Lot)	Lot	1	1	1	2	1
4.6.2	Condensate pots of each type & Size installed	(10% of total number of installed or four numbers whichever is higher to reach type of SCS= 1 Lot)	Lot	1	1	1	2	1
4.6.3	Fittings	(10% qty Installed of each Type & size for each type of SCS= 1 Lot)	Lot	1	1	1	2	1
	Notes for Mandatory Spares:							
1	For C&I Mandatory Spare not covered above: Bidder to supply 10% or 1 no. (whichever is more) of each type of sensor/instrument, analyzers /special instruments/Electronic card, instrumentation/mechanical fittings etc. for any other electronic system,							
2	Spares not applicable for the Package to be specifically quoted as "NOT APPLICABLE".							
3	In case if such items of spares indicated as "not applicable" by bidder in its offer, are found applicable at a later date during execution of the project, such items of spares are to be supplied within the ordered cost of the mandatory spares							
4	Wherever quantity has been specified as percentage (%), it shall mean percentage (%) of the total population of the item in the station (project), unless specified otherwise and the fraction will be rounded off to the next higher whole number.							
5	In case spares indicated in the list are not applicable to the particular design offered by the bidder, the bidder should offer spares applicable to offered design with Quantities generally in line with the specification.							
6	In respect of quantity mentioned as 'Set' means the total quantity of all the components/items used in particular equipment unless otherwise specified.							
7	Each spare shall be clearly marked and labeled on the outside of the packing with its description. When more than one spare part is packed in single case, a general description of the contents shall be shown on the outside of such case and a detailed list enclosed. All cases, containers and other packages must be suitably marked and numbered for the purpose of identification							



TITLE:

**TECHNICAL SPECIFICATION
SELF CLEANIGN STRAINER**

SPECIFIC TECHNICAL REQUIREMENTS

SPEC. NO.: **PE-TS-RC-165-N004**

SECTION: **II**

SUB-SECTION: **IIA**

REV. NO. **0** DATE **01.03.2017**

SHEET **1** OF **1**

SUB-SECTION - IIA

STANDARD TECHNICAL SPECIFICATION (MECHANICAL)

STANDARD TECHNICAL SPECIFICATION FOR SELF CLEAING STRAINER

STANDARD QUALITY PLAN

	TITLE : STANDARD TECHNICAL SPECIFICATION SELF CLEANING STRAINER (Backwash Type)	SPECIFICATION NO. PE-TS-XXX-165-N004	
		SECTION : II	
		SUB SECTION : 2A	
		REV. NO. 01	DATE : 20.06.2016
SHEET 1 OF 8			

1.00.00

GENERAL

This specification covers the Design, Performance and Operational Requirements, Constructional Features, Manufacture, Assembly. Inspection and Testing at the Manufacturer's and/or his Sub-contractor's works and Painting for delivery of Self-Cleaning Strainer (Backwash Type) complete with all accessories as specified hereinafter.

2.00.00

CODES AND STANDARDS

2.01.00 The design, materials manufacture, inspection and testing of the Self Cleaning Strainer complete with all accessories, shall comply with the requirements of the latest revisions of the following appropriate codes and standards :

2.01.01 IS/ BS/ DIN/ US Standards regarding pressure vessels, pipes, flanges and others as necessary.

2.01.02 IS/ BS/ DIN/ ASTM Standards for materials specification and testing procedures.

2.01.03 IS/ BS/ DIN/ AWWA Standards for valves and their testing.

2.02.00 In case of any conflict between the above codes/ standards and this specification, the later shall prevail and in case of any further conflict in the matter, the interpretation of the specification by the Engineer shall be final and binding.

3.00.00

DESIGN AND CONSTRUCTION

3.01.00 **General Requirements**

3.01.01 Unless otherwise necessary manufacturer's standard and proven models of the Self Cleaning Strainer shall be supplied.

3.01.02 The Self Cleaning Strainer shall be capable of safe, proper and continuous operation. Vibration, noise, mechanical stresses shall be kept within allowable limits specified by relevant codes / standards, in design due attention shall be given to ease of maintenance, repair and cleaning.

3.01.03 Suitable corrosion allowance shall be provided wherever necessary. Adequate provision for future installation of cathodic protection shall be provided.

3.01.04 The Self Cleaning Strainer shall be designed to suit installation in on-line or off-line arrangement as specified in Data Sheet-A.

In the on-line arrangement, the inlet and outlet pipes of the Self Cleaning Strainer shall be in line with each other on the same axis without any off-set between the centre lines of inlet and outlet pipes.
In the off-line arrangement, the Self Cleaning Strainer inlet and outlet pipes shall be at right angle (90°) to each other.

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3.02.00

Performance Requirements

The Self Cleaning Strainer with all accessories shall be designed and guaranteed to meet the following requirements:-

3.02.01

The Self Cleaning Strainer shall perform satisfactorily under the flow and pressure conditions specified in Data Sheet -A and shall be capable of housing the various forms of debris / sludge i.e., suspended particles / matter, mussels, grass, leaves, wood pieces etc. The performance of the Self Cleaning strainer shall be continuous with minimum number of flushing/ backwashing operations.

3.02.02

The Self Cleaning Strainer shall be designed such that the pressure drop across the Self Cleaning Strainer (i.e., between inlet and outlet connections) under clean conditions and partially (50%) choked conditions shall not be more than those specified in Data Sheet -A.

3.02.03

Unless otherwise specified in Data Sheet -A, debris discharge / wash water flow rate during flushing/back washing operation shall be limited to 10% of the total flow rate and flushing / backwashing operation shall be completed within a period of maximum three (3) minutes. The pressure drop across the Self Cleaning strainer during flushing/ backwashing operation shall not be more than the pressure drop under partially (50%) choked condition.

3.02.04

The coarse particles and floating matter accumulating at the filter section/screen are flushed out of the system by the system by the debris flushing / backwash unit such that the pressure drop across the filter after flushing / backwashing, shall not be more than 1.1 times the pressure drop under clean conditions.

3.03.00

Operational Requirement

The Self Cleaning Strainer and other accessories shall be designed for the following flushing/backwashing operation modes:

3.03.01

Complete automatic flushing/backwashing operation effected by the following:-

- ◆ differential pressure measuring system at a pre-determined differential pressure across the filter screen.
- ◆ adjustable timer (0-24 hours)
- ◆ push button (for manual initiation of sequential flushing / backwashing)

3.03.02

Manual operation in the event of failure of control system.

3.04.00

Filter Housing/ Body

3.04.01

The Self Cleaning Strainer housing/body shall be designed and manufactured as per the applicable codes for pressure vessels. It shall house the filter section / screen assembly and shall have flanged inlet, outlet, flushing/ debris discharge openings and pressure measuring tappings etc.

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3.04.02	In design of SCS housing/ body due attention shall be given for easy removal and replacement of filter section / screen assembly.
3.04.03	The Self Cleaning Strainer shall be provided with inspection hole with bolted cover.
3.04.04	The SCS body / housing shall be provided with vent and drain connections with isolating valves. It shall be possible to drain unfiltered and filtered water.
3.04.05	If specified in Data Sheet-A, filter body/housing shall be epoxy painted.
3.05.00	<u>Filter Section / Screen assembly.</u>
3.05.01	The Self Cleaning Strainer section/screen shall be designed for the maximum differential pressure across the filter and shall be securely positioned by a supporting cage and shall be securely mounted in the housing or body.
3.05.02	The perforation/mesh size of the strainer section shall not be more than that specified in Data Sheet-A.
3.05.03	The arrangement of the Strainer section shall be such that the forced accumulation of debris on the filter screen / section shall be minimum.
3.06.00	<u>Differential Pressure Measuring System</u>
3.06.01	The Self Cleaning Strainer shall be provided with a measuring system for differential pressure across the filter section/screen, to check debris accumulation and to initiate flushing/ backwashing operation. This shall consist of a differential pressure transmitter for automatic flushing operation, a differential pressure gauge for manual observation with adequate number of tapping with isolating valves and equalising valves.
3.06.02	The contacts for differential pressure transmitter and for differential pressure gauge shall be independent so that in the event of failure of one, the other is available.
3.06.03	The differential pressure measuring system shall be provided with D.P. transmitter & DPG of remote seal arrangement..
3.07.00	<u>Flushing / Backwash Unit. :</u>
3.07.01	The Self Cleaning Strainer shall be provided with suitable flushing/backwash unit (to be installed at ground floor) and debris discharge/ backwash outlet valve with associated actuator to flush out the accumulated debris/ sludge.
3.07.02	The flushing pump shall be provided with mechanical seals to the extent possible. If gland packing is provided it should be of good quality to prevent leakage of water from pump glands.

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3.07.03

The flushing arrangement shall be either fixed type with flushing valves or a rotating debris extractor.

3.07.04

If any water is to be injected for backwashing the filter section/screen, water shall be taken from down-stream side of the filter section/ screen. Necessary pump, valves and piping for water injection shall be supplied.

3.07.05

View glass to be provided in debris outlet pipe to monitor the flushing of debris.

3.08.00

Valves

The flushing valves (if any,) the debris discharge/backwash outlet valve, isolation, vent and drain valves shall conform to appropriate codes / standards.

3.09.00

Instrumentation and Control System

3.09.01

Complete instrumentation and control system for automatic flushing/backwashing operation, protection, interlocking, indication/ annunciation of high differential pressure and other malfunctions etc. shall be provided. This shall consist of adequate operational hardware, local control panel and interconnecting control and power cabling between the control panel and the Self Cleaning strainer and its associated electrical devices.

3.09.02

The control panel shall house all necessary instruments, indicating/ annunciation lamps, alarms, differential pressure indicator, timer, function selector switches, relays, protection and interlocking systems, start/stop push buttons, counter to register number of flushing operations etc., and shall be complete with internal wiring. In addition to the above, the control panel shall meet the requirements of the enclosed specification.

3.09.03

All instrumentation shall be of reputed make and shall meet the requirement of the enclosed specification.

3.10.00

Actuators :

The actuators for flushing arrangement and debris discharge valve shall be electric motor operated and shall meet the requirements of the enclosed specification. The actuators shall be provided with auxiliary hand-wheel for manual operation in the event of power failure.

3.11.00

Electric Motors :

The drive motors for differential pressure measuring system flushing pump and water injected pump (if applicable) shall confirm to the requirements of the enclosed specification.

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3..12.00	<u>Other Accessories.</u>
3.12.01	Counter flanges, complete with gaskets, bolts and nuts etc., shall be supplied for the filter inlet, outlet connections and all other terminal points. Fabrication, dimensions and drilling of the flanges shall conform to the codes/standards specified in Data Sheet-A/ Section -C.
3.12.02	Self Cleaning Filter shall be provided with suitable lifting arrangement for handling during erection and maintenance.
4.00.00	<u>SHOP INSPECTION AND TESTS</u>
4.01.00	<u>General:</u>
4.01.01	Manufacturer shall conduct all tests and stage inspections as per the approved quality plan to ensure that the Self Cleaning strainer and other accessories shall conform to the requirements of this specification and of the applicable codes/ standards.
4.01.02	All materials used for manufacture/fabrication of the Self Cleaning Strainer shall be of tested quality. Relevant test certificates for chemical analysis, mechanical tests and heat treatment shall be made available before the final shop inspection. In case the relevant test certificates are not available, the manufacturer shall arrange to carry out the necessary tests as per approved quality plan and applicable codes at his cost, for which samples shall be identified by BHEL's representative.
4.01.03	All shop tests shall be conducted in the presence of BHEL's representative and test certificates / reports for the same shall be furnished to BHEL for approval.
4.01.04	Qualification of welding procedures and welders shall be as per ASME B&PV Code, Section-IX / applicable codes.
4.02.00	<u>Filter Housing / Body</u>
4.02.01	Chemical analysis, mechanical tests shall be carried out on housing/body, strainer/ screen, strainer/ screen shaft and other appurtenances as per the applicable material specification standards.
4.02.02	All butt welded joints shall be subjected to radiographic / ultrasonic testing as per applicable codes. However all welded joints shall be subjected to 100% magnetic particle / penetrant testing to ensure freedom from defects.
4.03.00	<u>Rubber Lining (as applicable)</u>
	Rubber lining shall be subjected to surface crack test, 100% spark and hardness tests and shall be checked for layer thickness, defects etc.

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4.04.00

Filter Section/Screen assembly

Supporting cage and filter section/screen materials shall be tested for chemical properties. Checks shall be carried out for perforation/mesh size, defects etc.

4.05.00

Flushing / Backwash Unit

4.05.01

Material of various components of the flushing/Backwash Unit shall be tested for chemical and mechanical properties.

4.05.02

Hollow shaft of backwash rotor shall be ultrasonically tested as per ASTM-A 388 for internal flaws. Penetrant test shall be carried out for surface flaws.

4.06.00

Valves

Inspection and testing of valves including leakage test shall be carried out as per the requirements of the applicable standards. Correlating test certificates for materials of the valve components shall be furnished.

4.07.00

Flanges

4.07.01

In case of fabricated flanges, all the welds shall be subjected to 100% radiography as per ASME B&PV code, section VIII, Division-1.

4.07.02

In case of forged flanges, ultrasonic testing shall be carried out as per ASTM-A 388.

4.07.03

If the thickness of the plate used for flanged is 40mm or more the same shall be checked ultrasonically as per ASTM-A435 to demonstrate the absence of lamination and lack of fusion etc.

4.07.04

Chemical and mechanical test certificates shall be furnished for flange materials.

4.07.05

Flanges shall be checked for edge preparation, fit up and satisfactory working with matching parts.

4.08.00

All materials for various nozzles, seals, pipes, gaskets, nuts bolts etc., shall be of tested quality and correlating test certificates for chemical and mechanical properties shall be furnished.

4.09.00

Dimensional Checks

Dimensional checks of various components of the Self Cleaning Strainer shall be carried out as per the drawings approved by BHEL. Alignment and fit up of movable parts shall be checked.

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4.10.00	<u>Hydrostatic Test</u> Hydrostatic test shall be conducted on the Self Cleaning Strainer housing/body at a pressure of 1.5 times the design pressure. The duration of the test shall be minimum 30 minutes.		
4.11.00	<u>Leakage Test</u>		
	Leakage test shall be conducted at the design pressure to demonstrate that the filter assembly is leak tight and no water seepage shall take place at various nozzle and valve connections.		
4.12.00	<u>Functional Tests</u>		
	The Self Cleaning Strainer assembly complete with valves, actuators and other accessories shall be subjected to functional tests and the following shall be checked:-		
4.12.01	Smooth and free operation of all movable parts.		
4.12.02	Interlocks and sequential operation.		
4.12.03	Satisfactory operation of actuator torque switches, limit switches etc.		
4.13.0	Performance Test:		
	Performance Test shall be conducted to ensure that the Self Cleaning Strainer meets the specified performance requirements.		
5.00.00	<u>TESTING AT SITE</u>		
	After completion of installation at site, the Self Cleaning Strainer with complete accessories, will be tested to check that the filter performance meets the requirements of its specification, Rectification of all defects shall have to be done by the supplier at no extra cost to the Owner / Purchaser. However the Owner / Purchaser reserves the right to reject the equipment/ parts not meeting the requirement if the deficiency still persists.		
6.00.00	<u>QUALITY ASSURANCE & QUALITY PLAN</u>		
6.01.00	The Self Cleaning Strainer and other accessories to be supplied shall have assured quality and workmanship.		
6.02.00	Typical quality plans are enclosed herewith this specification for bidder's guidance. The bidder shall comply with these minimum requirements and shall furnishing own quality plan based on materials and components of the filter being offered.		



TITLE :
STANDARD TECHNICAL SPECIFICATION
SELF CLEANING STRAINER
(Backwash Type)

SPECIFICATION NO. PE-TS-XXX-165-N004

SECTION : II

SUB SECTION : 2A

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7.00.00 NAME PLATE AND TAG NUMBERS

7.01.00 The Self Cleaning Strainer shall be provided with a permanently attached brass or stainless steel plate indicating the following details:-

- a) Design and maximum flow rates
- b) Design and test pressures
- c) Design temperature
- d) Filter section/screen mesh size
- e) Empty and operating weights
- f) Revolving speed of backwash rotor

7.02.00 Each valve shall be provided with a name plate indicating the following:-

- a) Service
- b) Design and test pressures
- c) Maximum flow and flow direction
- d) Size
- e) Tag Number

Tag numbers will be indicated on the drawing submitted for approval during contract stage.

7.03.00 Each motor / actuator shall be provided with a name plate indicating the following details:

- a) Supply conditions.
- b) KW Rating
- c) Make

8.00.00 DRAWINGS, DATA & INFORMATION TO BE SUBMITTED AFTER THE AWARD OF CONTRACT:

The drawings, data and other documents as required in Data Sheet-C shall be furnished after the award of contract.

	TITLE : DATA SHEET - C SELF CLEANING STRAINER (Backwash Type)	SPECIFICATION NO. PE-TS-XXX-165-N004	
		SECTION : II	
		SUB SECTION : IIA	
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1.00.00 DRAWINGS, DATA AND INFORMATION TO BE SUBMITTED AFTER THE AWARD OF CONTRACT:

After the award of contract, the following drawings, data and information is to be submitted for review / approval of BHEL.

1.01.00 The drawings to be submitted by bidder in event of award of contract shall be as per NIT.

1.01.01 Data Sheet -B.

1.01.02 Final versions of the following drawings to enable BHEL to finalise the layout and to design foundations and structures.

a) General arrangement / Installation drawings of the Self Cleaning Strainer with all accessories, indicating the principal dimensions and weights of equipment offered, size and location of various nozzle connections, withdrawal space and scope of supply etc.

b) Foundation arrangement drawings (wherever applicable) showing load data on supports, size and location of anchor bolts etc.

1.02.00 Within the stipulated time period as per vendor's drawing/document list, the following shall be submitted:

1.02.01 Cross-sectional/detailed drawings of filter housing/body, filter screen/section assembly, flushing / backwash unit, differential pressure measuring system, actuators, motors, control panel etc. indicating bill of quantities and materials of construction.

1.02.02 Flow and control logic diagrams for complete filter during normal and flushing operation and system write-up covering all modes of operation.

1.02.03 Final version of performance evaluation procedures at site.

1.02.04 Detailed schedule of valves indicating tag numbers, type, make, size, pressure & temperature ratings, materials etc.

1.02.05 Detailed schedule of power & control cable.

1.02.06 Detailed schedule of piping and fittings indicating sizes, materials, maximum working pressure & temperatures etc.

1.02.07 Control panel layout and list of instruments provided on control panel and internal wiring diagrams.

1.02.08 List of annunciations, protections and interlocks provided.

	TITLE : DATA SHEET - C SELF CLEANING STRAINER (Backwash Type)	SPECIFICATION NO. PE-TS-XXX-165-N004	
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- 1.02.09 Detailed drawings of flanges.
- 1.02.10 Quality Plan
- 1.02.11 Material test certificates.
- 1.02.12 Shop tests reports and certificates.
- 1.02.13 Write-up and instruction manuals for erection, operation and maintenance.
- 1.02.14 Storage instructions.
- 1.02.15 Vendor to send 3 sets of final documents (O&M Manual, GA drg, P&ID) direct to site under intimation to PEM.

		Manufacturer's Name & Address		STANDARD QUALITY PLAN		BHEL Doc No.: PE-V4-XXX-165-N08	
		P.O. No.		Item :	Vendor Q.P. NO.	PROJECT:	
				Self Cleaning Strainer	PACKAGE : SELF CLEANING STRAINER	CUSTOMER:	
				Date :	PURCHASER:		
				Page 01 of 12	CONSULTANT:		
		SL. NO.	DESCRIPTION	PAGE NOS.			
		1	SELF CLEANING STRAINER	2-4			
		2	BALL VALVES	5			
		3	BUTTERFLY VALVES	6			
		4	PRESSURE GAUGE, DP GAUGE, DP SWITCH DP TRANSMITTER	7			
		5	GEAR MOTOR DRIVE & WORM PLANETARY GEAR BOX	8			
		6	ACTUATORS	9			
		7	STARTER PANEL	10			
		8	FASTENERS	11			
		9	ALL COMPONENT / EQUIPMENT	12			
			ANNEXURES				
			DRY RUN TEST PROCEDURE	2			
			HYDRO TEST PROCEDURE	2			
			HYDRO STATIC LEAK TIGHTNESS TESTING PROCEDURE	2			
			PACKING PROCEDURE	1			
Note: Items not included in quality plan to be inspected as per Approved datasheet/drawings.							
		LEGEND					
		* Records identified with "STAR" shall be essentially included by contractor in QA Documentation.					
		** M : Manufacturer/ Sub-contractor					
Manufacturer / Sub-Contractor		Contractor	C : CONTRACTOR	O : OWNER			
Signature			Indicate : "P" - Perform, "W" - Witness and "V" - Verification		Name & Sign. Of approving authority & Seal		

		Manufacturer's Name & Address		STANDARD QUALITY PLAN					BHEL Doc No.: PE-V4-XXX-165-N08				
		P.O. No.		Item :	Vendor Q.P. NO.	PACKAGE : SELF CLEANING STRAINER			PROJECT:				
				Self Cleaning Strainer					CUSTOMER:				
				Date :	Page 02 of 12			PURCHASER:					
										CONSULTANT:			
Sl. No.	Component / Operation	Characteristics Checked	Class	Type of Check	Quantum of Check	Reference Documents	Acceptance Norms	Format of Record	Agency			Remarks	
1	2	3	4	5	6	7	8	9	M	C	O	11	
1.0.0	SELF CLEANING STRAINER								**	10			
1.1.0	Raw Material												
[a]	Housing Shell, Nozzle flanges & Main flanges/Counter Flange	Chemical properties	Major	Chemical Analysis	One sample/cast / heat / batch	Approved drg/Data sheet	Approved drg/Data sheet	Mill Test Certificate / lab test report / raw material flow sheet	*	P	V	V	All raw material identification as per manufacturer TC/Lab report by BHEL
		Physical properties	Major	Physical test	One sample/cast / heat / batch	Approved drg/Data sheet	Approved drg/Data sheet	Mill Test Certificate / lab test report / raw material flow sheet	*	P	V	V	
		Surface Defects	Minor	Visual	100%	Approved drg/Data sheet	Approved drg/Data sheet	Mill Test Certificate /lab test report /raw material flow sheet	-	P	V	V	
		Sub Surface Defects	Major	Ultrasonic Test	100%	ASME A 435/A609	ASME A 435/A609	Inspection report	*	P	V	V	Plates > 20mm Thk only
[b]	Nozzle Pipes	Chemical properties	Major	Chemical Analysis	One sample/cast / heat / batch	Approved drg/Data sheet	Approved drg/Data sheet	Mill Test Certificate / lab test report / raw material flow sheet	*	P	V	V	
		Physical properties	Major	Physical test	One sample/cast / heat / batch	Approved drg/Data sheet	Approved drg/Data sheet	Mill Test Certificate / lab test report / raw material flow sheet	*	P	V	V	
		Surface defects	Minor	Visual	100%	Approved drg/Data sheet	Approved drg/Data sheet	Mill Test Certificate /lab test report /raw material flow sheet	-	P	V	V	
		Leak tightness	Major	Hydrostatic test	100%	Approved drg/Data sheet	Approved drg/Data sheet	Mill Test Certificate /lab test report /raw material flow sheet	-	P	V	V	
[c]	Screen basket, Nozzle flanges	Chemical properties	Major	Chemical Analysis	One sample/cast / heat / batch	Approved drg/Data sheet	Approved drg/Data sheet	Mill Test Certificate / lab test report / raw material flow sheet	*	P	V	V	
		Physical properties	Major	Physical test	One sample/cast / heat / batch	Approved drg/Data sheet	Approved drg/Data sheet	Mill Test Certificate / lab test report / raw material flow sheet	*	P	V	V	
		Surface Defects	Minor	Visual	100%	Approved drg/Data sheet	Approved drg/Data sheet	Mill Test Certificate /lab test report /raw material flow sheet	-	P	V	V	
		Sub-surface defects	Major	Ultrasonic test	100%	ASME A 745	ASME A 745	Inspection report	*	P	V	V	Plates > 20mm Thk only (UT full volume)
		Corrosion Resistance	Major	IGCI	One/Heat	ASTM A 262	Practice E of ASTM A 262	Test Report	*	P	V	V	
LEGEND * Records identified with "STAR" shall be essentially included by contractor in QA Documentation. ** M : Manufacturer/ Sub-contractor C : CONTRACTOR O: OWNER Indicate : "P" - Perform, "W" - Witness and "V" - Verification													
Manufacturer / Sub-Contractor		Contractor		Name & Sign. Of approving authority & Seal									
Signature													

		Manufacturer's Name & Address		STANDARD QUALITY PLAN					BHEL Doc No.: PE-V4-XXX-165-N08				
		P.O. No.		Item :		Vendor Q.P. NO.		PROJECT:		CUSTOMER:			
				Self Cleaning Strainer		PACKAGE : SELF CLEANING STRAINER		PURCHASER:					
						Date :		CONSULTANT:					
						Page 03 of 12							
Sl. No.	Component / Operation	Characteristics Checked	Class	Type of Check	Quantum of Check	Reference Documents	Acceptance Norms	Format of Record	Agency			Remarks	
1	2	3	4	5	6	7	8	9	M	C	O	11	
[d]	Nozzle Pipes	Chemical properties	Major	Chemical Analysis	One sample/cast / heat / batch	Approved drg/Data sheet	Approved drg/Data sheet	Mill Test Certificate / lab test report / raw material flow sheet	*	P	V	V	
		Physical properties	Major	Physical test	One sample/cast / heat / batch	Approved drg/Data sheet	Approved drg/Data sheet	Mill Test Certificate / lab test report / raw material flow sheet	*	P	V	V	
		Surface defects	Minor	Visual	100%	Approved drg/Data sheet	Approved drg/Data sheet	Mill Test Certificate/ Inspection Report	-	P	V	V	
		Leak tightness	Major	Hydrostatic test	100%	Approved drg/Data sheet	Approved drg/Data sheet	Mill Test Certificate/ Inspection Report	-	P	V	V	
1.2.0	Inprocess Quality Control												
1.2.1	Welding procedure specification	Correctness	Critical	Scrutiny	100%	ASME Sec. IX	ASME Sec. IX	QW 482 of ASME Sec.IX	-	P	V	V	Welders already qualified by BHEL/ LRQA / NTPC in the past shall be employed for this job.
1.2.2	Welding procedure qualification	Weld soundness	Critical	Physical test	100%	ASME Sec. IX	ASME Sec. IX	QW 483 of ASME Sec.IX	-	P	V	V	Welding procedure already approved by BHEL/ LRQA / NTPC shall be followed.
1.2.3	Welder performance qualification	Weld soundness	Critical	Physical test	100%	ASME Sec. IX	ASME Sec. IX	QW 484 of ASME Sec.IX	-	P	V	V	Welders already qualified by BHEL/ LRQA / NTPC shall be employed for this job.
1.2.4	Fit-up of butt weld	Alignment, and dimensions	Major	Template, visual	100%	Manufacturing Drawing	ASME Sec.VIII Div. I	Log book	-	P	V	-	BHEL to witness >20mm thick butt joint.
1.2.5	Fit-up of shell flange and nozzle assembly to shell	Orientation, alignment and dimensions	Major	Template, visual	100%	Manufacturing Drawing	ASME Sec.VIII Div. I	Log book	-	P	-	-	
1.2.6	Weld quality for Pressure Parts												
[a]	Root run	Surface defects	Major	Penetrant test / Visual	100%	ASME Sec.VIII Div. I / sec V	ASME Sec.VIII Div. I Appendix 8	Operation Process Sheet		P	-	-	
[a]	Completed butt welds	1.Surface defects	Major	Penetrant test	100%	ASME Sec.VIII Div. I / sec V	ASME Sec.VIII Div. I Appendix 8	Inspection report	*	P	V	V	
		2.Sub-surface defects	Critical	Radiography test	10% of total weld length+ 100% T Joints.	ASME Sec.VIII Div. I / sec V	ASME Sec.VIII Div. I Appendix 4 / UW 52	Radiographs and inspection report	*	P	V	V	RT films will be reviewed by BHEL
[b]	Completed fillet welds	Surface defects	Major	Penetrant test	100%	ASME Sec.VIII Div. I / sec V	ASME Sec.VIII Div. I Appendix 8	Inspection report	*	P	V	V	
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Manufacturer / Sub-Contractor		Contractor		Name & Sign. Of approving authority & Seal									
Signature													

		Manufacturer's Name & Address		STANDARD QUALITY PLAN					BHEL Doc No.: PE-V4-XXX-165-N08				
		P.O. No.		Item :		Vendor Q.P. NO.		PROJECT:					
				Self Cleaning Strainer		PACKAGE : SELF CLEANING STRAINER		CUSTOMER:					
				Date :		PURCHASER:							
						Page 04 of 12		CONSULTANT:					
Sl. No.	Component / Operation	Characteristics Checked	Class	Type of Check	Quantum of Check	Reference Documents	Acceptance Norms	Format of Record	Agency			Remarks	
1	2	3	4	5	6	7	8	9	M	C	O	11	
1.2.8	Pickling and Passivation	Protection Layer	Major	Visual	100%	IS : 10117	IS : 10117	Log Book	--	P	-	-	
1.2.9	Fabricated Shell (Prior to sand blasting)	1.Dimensions, Orientation	Major	Measurement by visual	100%	Manufacturing Drawing	Manufacturing Drawing	Inspection report	*	P	V	V	
		2. Hydro test	Critical	Hydrostatic Pr. @ 1.5 times of design pr.(positive) [Duration 30 minutes]	100%	ASME Sec.VIII Div.1	ASME Sec.VIII Div.1	Inspection report	*	P	V	V	
1.3.0	Final tests (completed equipments) - After assembly	1.Dimensions, orientation, workmanship & finish	Major	Measurement by visual	100%	G.A.drawing	G.A.drawing	Inspection report	*	P	V	V	
		2. Leak tightness for assembly	Critical	Leak test @ design pr.(positive) [Duration minutes] 30	100%	ASME Sec.VIII Div.1	No leakage	Inspection report	*	P	W	V	
		3.Dry function test for Debris filter	Critical	Operational test	100%	Approved Procedure	Approved Procedure	Inspection report	*	P	W	V	
1.4.0	Rubber Lining (Shell)												
1.4.1	Rubber Formulation	Tensile, elongation & hardness	Major	Physical test	One per lot	Manufacturer's procedure	BS 6374/Equivalent	Manufacturers Test certificate	*	P	V	V	
		Polymer Identification	Major	Flame test	One per lot	For Semi Ebonite /Ebonite Polymer catches fire and on removal from fire continues to bum	For Semi Ebonite /Ebonite Polymer catches fire and on removal from fire continues to bum	Inspection report		P	V	V	
		% Change in weight after 24 hours of immersion in sea water at 70°	Major	Immersion test (bleeding test)	One per lot	ASTM D 471	+/- 1%	Inspection report		P	V	V	
1.4.2	Surface preparation of items to be lined	Free from rust, scale, dust & grease	Major	Visual	100%	SA 2.5	SA 2.5	Manufacturers Internal Inspection report		P	-	-	
1.4.3	Vulcanising	Temperature, Pressure & Time	Major	Process monitoring	100%	Manufacturer's procedure	Manufacturer Procedure	Process Procedure		P	-	-	
1.4.4	Vulcanised Rubber Lined items	[a] Chip test	Major	Chip test	One per lot	Approved Drawing & BS 6374/Equivalent	BS 6374/Equivalent	Inspection report	*	P	V	V	
		[b] Adhesion, Visual defects, Thickness & Hardness	Major	Measurement, Visual Inspection	100% visual Thickness/ hardness at random	Approved Drawing & BS 6374/Equivalent	BS 6374/Equivalent	Inspection report	*	P	V	V	
		[c] Spark test for Pin Holes at 5 kv/mm	Major	Spark test for Pin Holes	100%	Approved Drawing & BS 6374/Equivalent	BS 6374/Equivalent	Inspection report	*	P	V	V	
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Manufacturer / Sub-Contractor		Contractor		Name & Sign. Of approving authority & Seal									
Signature													

		Manufacturer's Name & Address		STANDARD QUALITY PLAN					BHEL Doc No.: PE-V4-XXX-165-N08			
		P.O. No.		Item :		Vendor Q.P. NO.		PROJECT:		CUSTOMER:		
				Ball Valves		PACKAGE : SELF CLEANING STRAINER		PURCHASER:		CONSULTANT:		
						Date :		Page 05 of 12				
Sl. No.	Component / Operation	Characteristics Checked	Class	Type of Check	Quantum of Check	Reference Documents	Acceptance Norms	Format of Record	Agency			Remarks
1	2	3	4	5	6	7	8	9	M	C	O	11
2.0.0	Ball valves											
2.1.0	Materials											
	Body and Tail end pieces	Chemical properties	Major	Chemical properties	One Sample/Cast / heat	Approved drg/Data sheet	Approved drg/Data sheet	Manufacturer's T.C.	*	P	V	V
		Physical properties	Major	Physical properties	One Sample/Cast / heat / batch	Approved drg/Data sheet	Approved drg/Data sheet	Manufacturer's T.C.	*	P	V	V
2.1.1	Ball	Chemical properties	Major	Chemical properties	One Sample/Cast / heat	Approved drg/Data sheet	Approved drg/Data sheet	Manufacturer's T.C.	*	P	V	V
		Physical properties	Major	Physical properties	One Sample/Cast / heat / batch	Approved drg/Data sheet	Approved drg/Data sheet	Manufacturer's T.C.	*	P	V	V
2.1.2	Stem	Chemical properties	Major	Chemical properties	One Sample/Cast / heat	Approved drg/Data sheet	Approved drg/Data sheet	Manufacturer's T.C.	*	P	V	V
		Physical properties	Major	Physical properties	One Sample/Cast / heat / batch	Approved drg/Data sheet	Approved drg/Data sheet	Manufacturer's T.C.	*	P	V	V
2.2.0	In-process inspection											
2.2.1	Ball	Hardness	Major	Hardness Testing	Random	Approved Drg. / Data Sheet	Approved Drg. / Data Sheet	Manufacturers TC	*	P	V	V
2.3.0	Assembly	a) Dimensions	Major	Measurement	100%	Approved drg/Data sheet	Approved drg/Data sheet	Manufacturer's T.C.	*	P	V	V
		b) Opening / Closing	Major	Operation	100%	—	As per approved data sheet	—		P	—	V
2.4.0	Testing											
	(a) Body	Leakage	Critical	Hydraulic test	100%	EN 12266-1&2	EN 12266-1&2 / Appd. Data sheet	Manufacturer's T.C.	*	P	V	V
	(b) Seat test	Leakage	Critical	Hydraulic test	100%	EN 12266-1&2	EN 12266-1&2 / Appd. Data sheet	Manufacturer's T.C.	*	P	V	V
	(c) Seat	Leakage	Critical	Air test	100%	EN 12266-1&2	EN 12266-1&2 / Appd. Data sheet	Manufacturer's T.C.	*	P	V	V
		LEGEND										
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		** M : Manufacturer/ Sub-contractor										
Manufacturer / Sub-Contractor		Contractor		C : CONTRACTOR		O : OWNER						
Signature				Indicate "P" - Perform, "W" - Witness and "V" - Verification				Name & Sign. Of approving authority & Seal				

		Manufacturer's Name & Address		STANDARD QUALITY PLAN					BHEL Doc No.: PE-V4-XXX-165-N08			
		P.O. No.		Item :		Vendor Q.P. NO.		PROJECT:				
				Self Cleaning Strainer		PACKAGE : SELF CLEANING STRAINER		CUSTOMER:				
						Date : Page 06 of 12		PURCHASER:				
								CONSULTANT:				
Sl. No.	Component / Operation	Characteristics Checked	Class	Type of Check	Quantum of Check	Reference Documents	Acceptance Norms	Format of Record	Agency			Remarks
1	2	3	4	5	6	7	8	9	M	C	O	11
3.0.0	Butterfly valves											
3.1.0	Materials											
	Body and Disc	Chemical properties	Major	Chemical properties	One Sample/Cast / heat	Approved drg/Data sheet	Approved drg/Data sheet	Manufacturer's T.C.	*	P	V	V
		Physical properties	Major	Physical properties	One Sample/Cast / heat / batch	Approved drg/Data sheet	Approved drg/Data sheet	Manufacturer's T.C.	*	P	V	V
3.1.1	Shaft	Chemical properties	Major	Chemical properties	One Sample/Cast / heat	Approved drg/Data sheet	Approved drg/Data sheet	Manufacturer's T.C.	*	P	V	V
		Physical properties	Major	Physical properties	One Sample/Cast / heat / batch	Approved drg/Data sheet	Approved drg/Data sheet	Manufacturer's T.C.	*	P	V	V
3.1.2	Seal	-	Major	-	One Sample/Cast / heat	Approved drg/Data sheet	Approved drg/Data sheet	Manufacturer's T.C.	*	P	V	V
3.1.3	Stem	Chemical properties	Major	Chemical properties	One Sample/Cast / heat	Approved drg/Data sheet	Approved drg/Data sheet	Manufacturer's T.C.	*	P	V	V
		Physical properties	Major	Physical properties	One Sample/Cast / heat / batch	Approved drg/Data sheet	Approved drg/Data sheet	Manufacturer's T.C.	*	P	V	V
3.2.0	Assembly	a) Dimensions	Major	Measurement	100%	EN 17292/Appd data sheet	ISO EN ISO 17292/Appd data sheet	Manufacturer's T.C.	*	P	V	V
		b) Opening / Closing	Major	Operation	100%	-	As per approved data sheet	-	*	P	-	-
3.3.0	Testing											
	[a] Body	Leakage	Critical	Hydraulic test	100%	EN 12266-1&2/API 598	EN 12266-1&2/API 598 & Appd. Data sheet	Manufacturer's T.C.	*	P	V	V
	[b] Seal test	Leakage	Critical	Hydraulic test	100%	EN 12266-1&2/API 598	EN 12266-1&2/API 598 & Appd. Data sheet	Manufacturer's T.C.	*	P	V	V
	[c] Seat	Leakage	Critical	Air test	100%	EN 12266-1&2/API 598	EN 12266-1&2/API 598 & Appd. Data sheet	Manufacturer's T.C.	*	P	V	V
		LEGEND										
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				** M : Manufacturer/ Sub-contractor								
Manufacturer / Sub-Contractor		Contractor		C : CONTRACTOR		O : OWNER						
Signature				Indicate : "P" - Perform, "W" - Witness and "V" - Verification								Name & Sign. Of approving authority & Seal

		Manufacturer's Name & Address		Manufacturing Quality Plan					BHEL Doc No.: PE-V4-XXX-165-N08					
		P.O. No.		Item : Pressure Gauge, DP Gauge, DP switch&DP Transmitter		Vendor Q.P. NO.			PROJECT:					
						PACKAGE : SELF CLEANING STRAINER			CUSTOMER:					
						Date : Page 07 of 12			PURCHASER:					
									CONSULTANT:					
Sl. No.	Component / Operation	Characteristics Checked	Class	Type of Check	Quantum of Check	Reference Documents	Acceptance Norms	Format of Record	Agency				Remarks	
1	2	3	4	5	6	7	8	9	**	M	C	O	11	
4.0.0	In process quality control	Make, Range and Model	Critical	Visual	100%	Approved Sheet	Data	Approved Data Sheet	Manufacturer test certificate	*	P	V	V	
		Calibration	Critical	Calibration test	100%	Approved Sheet	Data	Approved Data Sheet	Manufacturer test certificate	*	V	V	V	
		Degree of protection	Critical	-	Type test certificate	Approved Sheet	Data	Approved Data Sheet	Manufacturer test certificate	*	V	V	V	
DMS (BHEL-PEM) 6043712-24/12/2015														
Manufacturer / Sub-Contractor Signature			Contractor Signature		LEGEND * Records identified with "STAR" shall be essentially included by contractor in QA Documentation. ** M : Manufacturer/ Sub-contractor C : CONTRACTOR O: OWNER Indicate : "P" - Perform, "W" - Witness and "V" - Verification				Name & Sign. Of approving authority & Seal					

		Manufacturer's Name & Address		Manufacturing Quality Plan					BHEL Doc No.: PE-V4-XXX-165-N08				
		P.O. No.		Item : Geared Motor drive & Worm planetary Gear box		Vendor Q.P. NO.		PROJECT:		CUSTOMER:			
						PACKAGE : SELF CLEANING STRAINER		PURCHASER:					
						Date : Page 08 of 12		CONSULTANT:					
Sl. No.	Component / Operation	Characteristics Checked	Class	Type of Check	Quantum of Check	Reference Documents	Acceptance Norms	Format of Record	Agency			Remarks	
1	2	3	4	5	6	7	8	9	M	C	O	11	
5.0.0	GEARED MOTOR DRIVE	Running Test	Critical	Functional Test	100%	Approved Data Sheet	Approved Data Sheet	Manufacturer's compliance certificate	*	P	V	V	
		No load	Critical	Functional test	100%	Approved Data Sheet	Approved Data Sheet		*	P	V	V	
		Noise test	Critical	Functional test	100%	Approved Data Sheet	Approved Data Sheet		*	P	V	V	
		Oil leakage test	Critical	Functional test	100%	Approved Data Sheet	Approved Data Sheet		*	P	V	V	
		Visual	Critical	-	100%	Approved Data Sheet	Approved Data Sheet		*	P	V	V	
		Name plate verification	Critical	-	100%	Approved Data Sheet	Approved Data Sheet		*	P	V	V	
5.1.0	Complete Unit of planetary gear	No Leak Test	Critical	Functional test	One Sample/lot	Approved Data Sheet	Supplier Catalogue	Manufacturer's compliance certificate	*	P	V	V	
		Noise Level	Minor	Functional test	One Sample/lot	Approved Data Sheet	Approved Data Sheet			P	V	V	
		Visual Name plate Verification	Minor	-	100%	Approved Data Sheet	Approved Data Sheet			P	V	V	
			LEGEND										
			* Records Identified with "STAR" shall be essentially included by contractor in QA Documentation.										
			** M : Manufacturer/ Sub-contractor										
Manufacturer / Sub-Contractor			Contractor		C : CONTRACTOR		O: OWNER						
Signature					Indicate : "P" - Perform, "W" - Witness and "V" - Verification				Name & Sign. Of approving authority & Seal				

		Manufacturer's Name & Address		Manufacturing Quality Plan				BHEL Doc No.: PE-V4-XXX-165-N08					
		P.O. No.		Item : Actuators		Vendor Q.P. NO.		PROJECT:		CUSTOMER:			
				PACKAGE : SELF CLEANING STRAINER		PURCHASER:							
				Date : Page 09 of 12		CONSULTANT:							
Sl. No.	Component / Operation	Characteristics Checked	Class	Type of Check	Quantum of Check	Reference Documents	Acceptance Norms	Format of Record	Agency			Remarks	
1	2	3	4	5	6	7	8	9	M	C	O	11	
6.0.0	Actuators	Functional test	Major	Electrical test	100%	Supplier catalogue/Appd data sheet	Supplier catalogue/Appd data sheet	Test certificate	*	P	V	V	
		Make, Range, Model	Major	Visual	100%	Supplier catalogue/Appd data sheet	Supplier catalogue/Appd data sheet	Inspection Report	-	P	-	-	
		Assembly check alongwith valves	Major	Visual	100%	Supplier catalogue/Appd data sheet	Supplier catalogue/Appd data sheet	Inspection Report	-	P	-	-	
		Functional Check along with settings / Auxiliary Contacts	Major	Visual	100%	Supplier catalogue	Supplier catalogue/Appd data sheet	Inspection Report	-	P	-	-	Review of TC's
			LEGEND * Records identified with "STAR" shall be essentially included by contractor in QA Documentation. ** M : Manufacturer/ Sub-contractor C : CONTRACTOR O: OWNER Indicate : "P" - Perform, "W" - Witness and "V" - Verification										
Manufacturer / Sub-Contractor Signature			Contractor								Name & Sign. Of approving authority & Seal		

Sl. No.		Component / Operation	Characteristics Checked	Class	Type of Check	Quantum of Check	Reference Documents	Acceptance Norms	Format of Record	Agency			Remarks
1		2	3	4	5	6	7	8	9	M	C	O	11
7.0.0		Starter panel											
7.1.0		Incoming Material											
7.1.1		Fabricated & Painted Panel	Dimension	Major	Measurement	100%	Approved Drgs.	Approved Drgs.	Inspection report	-	P	-	7 Tank treatment before painting
			Panel G.A.	Major	Measurement	100%	Approved Drgs.	Approved Drgs.	Inspection report	-	P	-	
			Paint colour	Major	Visual	100%	Approved Drgs.	Approved Drgs.	Inspection report	-	P	-	
			Paint thickness	Major	Measurement	100%	Approved Drgs.	Approved Drgs.	Inspection report	-	P	-	
			Paint Shade, Adhesion	Major	Visual	Sample	Approved Drgs.	Approved Drgs.	Inspection report	-	P	-	
7.1.2		Wire	Size / Colour / Rating / Surface Defects	Major	Visual / Dimension	Sample	IS 694	Specification drawings	Inspection report	-	P	-	ISI Marked wire
7.1.3		Panel Mounting	Make, Functional, Type & Rating	Major	Visual / Electrical	100%	Approved BOM	Approved BOM	---		P	V	For bolt list refer starter panel document Part - II
7.2.0		In Process Inspection											
7.2.1		Name Plate, Component Mounting, Etc.	Workmanship, Finish, Correctness	Major	Visual	100%	Approved Drgs.	Approved drawings	Inspection report	-	P	-	
7.2.2		Electrical Wiring of Panels	Continuity, Colour of wires, Bunching and Grouping	Major	Visual	100%	Mounting Drawing	Approved drawings	Inspection report	-	P	-	
7.2.3		Ferruling of Cables	Start & End	Major	Visual	100%	Manufacturer's drawing	Manufacturer's drawing	Inspection report	-	P	-	
7.3.0		Final Inspection											
7.3.1		Workmanship, Finish & Paint shade / Thickness	Visual	Major	Visual	100%	G.A Drawing	Approved drgs.	Inspection report	*	P	W	V
7.3.2		Overall Dimension, G.A of starter panel	Measurement	Major	Visual	100%	G.A Drawing	Approved drgs.	Test Certificate	-	P	W	V
7.3.3		Component Identification	Visual	Major	Visual	100%	G.A Drawing	Approved drgs.	Inspection report	-	P	W	V
7.3.4		IR - HV - IR	Electrical	Critical	Electrical	100%	Mfg.Procedure	Mfg. Pocerure	Inspection report	-	P	W	V
7.3.5		Functional & Continuity	Functional	Major	Functional	100%	Appd Drawing	Appd Drawing	Inspection report	*	P	W	V
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Manufacturer / Sub-Contractor		Contractor		Name & Sign. Of approving authority & Seal									
Signature													

		Manufacturer's Name & Address		Manufacturing Quality Plan					BHEL Doc No.: PE-V4-XXX-165-N08			
		P.O. No.		Item : Fasteners		Vendor Q.P. NO.		PROJECT:				
				PACKAGE : SELF CLEANING STRAINER		CUSTOMER:						
				Date : Page 11 of 12		PURCHASER:						
								CONSULTANT:				
Sl. No.	Component / Operation	Characteristics Checked	Class	Type of Check	Quantum of Check	Reference Documents	Acceptance Norms	Format of Record	Agency			Remarks
1	2	3	4	5	6	7	8	9	M	C	O	11
8.1.0	Internal Fasteners - SS											
8.1.1	Stainless Steel Fasteners	Chemical properties	Major	Chemical analysis	1 Per heat/HT Batch	Approved Drawing	Approved Drawing	Test certificate/Compliance certificate	--	P	V	V
		Physical properties	Major	Physical test	1 per heat	Approved Drawing	Approved Drawing	Test certificate/Compliance certificate	--	P	V	V
		Visual and Workmanship finish	Major	Visual	Sample	Approved Drawing	Approved Drawing	Inspection report	--	P	V	V
		Dimensions	Major	Measurement	Sample	Approved Drawing	Approved Drawing	Inspection report	--	P	V	V
8.2.0	Carbon steel fasteners	Visual	Major	Visual	Sample	Approved Drawing	Approved Drawing	Manufacturer's certificate / Lab Report	--	P	V	V
		Dimensions	Major	Measurement	Sample	Approved Drawing	Approved Drawing	Manufacturer's certificate / Lab Report	--	P	V	V
		Physical properties	--	Physical test	1 sample per heat	IS : 1367	IS : 1367	Manufacturer's certificate / Lab Report	--	P	V	V
				a) Tensile								
				b) Yield								
				c) Elongation								
				d) Proof load								
			LEGEND									
			* Records identified with "STAR" shall be essentially included by contractor in QA Documentation.									
			** M : Manufacturer/ Sub-contractor									
			C : CONTRACTOR									
			O : OWNER									
			Indicate : "P" - Perform, "W" - Witness and "V" - Verification									
Manufacturer / Sub-Contractor			Contractor									
Signature											Name & Sign. Of approving authority & Seal	

		Manufacturer's Name & Address		Manufacturing Quality Plan					BHEL Doc No.: PE-V4-XXX-165-N08			
		P.O. No.		Item : All components / Equipments		Vendor Q.P. NO.		PROJECT:				
						PACKAGE : SELF CLEANING STRAINER		CUSTOMER:				
						Date :		PURCHASER:				
						Page 12 of 12		CONSULTANT:				
Sl. No.	Component / Operation	Characteristics Checked	Class	Type of Check	Quantum of Check	Reference Documents	Acceptance Norms	Format of Record	Agency			Remarks
1	2	3	4	5	6	7	8	9	M	C	O	11
9.0.0	All Components / Equipments	Painting Dry film thickness and	Major	Measurement	Random	Painting schedule	Painting schedule	Inspection report	P	V	V	
		Packing	Major	Measurement	100%	Packing Procedure	Packing Procedure	Inspection report	P	-	-	
			LEGEND * Records identified with "STAR" shall be essentially included by contractor in QA Documentation. ** M : Manufacturer/ Sub-contractor C : CONTRACTOR O: OWNER Indicate : "P" - Perform, "W" - Witness and "V" - Verification									
Manufacturer / Sub-Contractor			Contractor						Name & Sign. Of approving authority & Seal			
Signature												



TITLE:

**TECHNICAL SPECIFICATION
SELF CLEANING STRAINER**

STANDARD TECHNICAL REQUIREMENTS

SPEC. NO.: **PE-TS-RC-165-N004**

SECTION: **II**

SUB-SECTION: **IIB**

REV. NO. **0** DATE **24.03.2017**

SHEET **1** OF **1**

SUB-SECTION - IIB

STANDARD TECHNICAL SPECIFICATION (ELECTRICAL)



TITLE :
GENERAL TECHNICAL REQUIREMENTS

FOR

LV MOTORS

SPECIFICATION NO. PE-SS-999-506-E101
VOLUME NO. : II-B
SECTION : D
REV NO. : 00 DATE : 29/08/2005
SHEET : 1 OF 1

GENERAL TECHNICAL REQUIREMENTS

FOR

LV MOTORS

SPECIFICATION NO.: PE-SS-999-506-E101 Rev 00

	TITLE : GENERAL TECHNICAL REQUIREMENTS FOR LV MOTORS	SPECIFICATION NO. PE-SS-999-506-E101
		VOLUME NO. : II-B
		SECTION : D
		REV NO. : 00 DATE : 29/08/2005
		SHEET : 1 OF 4

1.0

INTENT OF SPECIFIATION

The specification covers the design, materials, constructional features, manufacture, inspection and testing at manufacturer’s work, and packing of Low voltage (LV) squirrel cage induction motors along with all accessories for driving auxiliaries in thermal power station.

Motors having a voltage rating of below 1000V are referred to as low voltage (LV) motors.

2.0

CODES AND STANDARDS

Motors shall fully comply with latest edition, including all amendments and revision, of following codes and standards:

IS:325	Three phase Induction motors
IS : 900	Code of practice for installation and maintenance of induction motors
IS: 996	Single phase small AC and universal motors
IS: 4722	Rotating Electrical machines
IS: 4691	Degree of Protection provided by enclosures for rotating electrical machines
IS: 4728	Terminal marking and direction of rotation rotating electrical machines
IS: 1231	Dimensions of three phase foot mounted induction motors
IS: 8789	Values of performance characteristics for three phase induction motors
IS: 13555	Guide for selection and application of 3-phase A.C. induction motors for different types of driven equipment
IS: 2148	Flame proof enclosures for electrical appliance
IS: 5571	Guide for selection of electrical equipment for hazardous areas
IS: 12824	Type of duty and classes of rating assigned
IS: 12802	Temperature rise measurement for rotating electrical machnines
IS: 12065	Permissible limits of noise level for rotating electrical machines
IS: 12075	Mechanical vibration of rotating electrical machines

In case of imported motors, motors as per IEC-34 shall also be acceptable.

3.0

DESIGN REQUIREMENTS

3.1

Motors and accessories shall be designed to operate satisfactorily under conditions specified in data sheet-A and Project Information, including voltage & frequency variation of supply system as defined in Data sheet-A

3.2

Motors shall be continuously rated at the design ambient temperature specified in Data Sheet-A and other site conditions specified under Project Information
Motor ratings shall have at least a 15% margin over the continuous maximum demand of the driven equipment, under entire operating range including voltage & frequency variation specified above.

3.3

Starting Requirements

3.3.1

Motor characteristics such as speed, starting torque, break away torque and starting time shall be properly co-ordinated with the requirements of driven equipment. The accelerating torque at any speed with the minimum starting voltage shall be at least 10% higher than that of the driven equipment.

3.3.2

Motors shall be capable of starting and accelerating the load with direct on line starting without exceeding acceptable winding temperature.

	TITLE : GENERAL TECHNICAL REQUIREMENTS FOR LV MOTORS	SPECIFICATION NO. PE-SS-999-506-E101
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		SHEET : 2 OF 4
The limiting value of voltage at rated frequency under which a motor will successfully start and accelerate to rated speed with load shall be taken to be a constant value as per Data Sheet - A during the starting period of motors.		
3.3.3 The following frequency of starts shall apply i) Two starts in succession with the motor being initially at a temperature not exceeding the rated load temperature. ii) Three equally spread starts in an hour the motor being initially at a temperature not exceeding the rated load operating temperature. (not to be repeated in the second successive hour) iii) Motors for coal conveyor and coal crusher application shall be suitable for three consecutive hot starts followed by one hour interval with maximum twenty starts per day and shall be suitable for minimum 20,000 starts during the life time of the motor		
3.4 Running Requirements		
3.4.1 Motors shall run satisfactorily at a supply voltage of 75% of rated voltage for 5 minutes with full load without injurious heating to the motor.		
3.4.2 Motor shall not stall due to voltage dip in the system causing momentary drop in voltage upto 70% of the rated voltage for duration of 2 secs.		
3.5 Stress During bus Transfer		
3.5.1 Motors shall withstand the voltage, heavy inrush transient current, mechanical and torque stress developed due to the application of 150% of the rated voltage for at least 1 sec. caused due to vector difference between the motor residual voltage and the incoming supply voltage during occasional auto bus transfer.		
3.5.2 Motor and driven equipment shafts shall be adequately sized to satisfactorily withstand transient torque under above condition.		
3.6 Maximum noise level measured at distance of 1.0 metres from the outline of motor shall not exceed the values specified in IS 12065.		
3.7 The max. vibration velocity or double amplitude of motors vibration as measured at motor bearings shall be within the limits specified in IS: 12075.		
4.0 CONSTRUCTIONAL FEATURES		
4.1 Indoor motors shall conform to degree of protection IP: 54 as per IS: 4691. Outdoor or semi-indoor motors shall conform to degree of protection IP: 55 as per IS: 4691 and shall be of weather-proof construction. Outdoor motors shall be installed under a suitable canopy		
4.2 Motors upto 160KW shall have Totally Enclosed Fan Cooled (TEFC) enclosures, the method of cooling conforming to IC-0141 or IC-0151 of IS: 6362. Motors rated above 160 KW shall be Closed Air Circuit Air (CACA) cooled		
4.3 Motors shall be designed with cooling fans suitable for both directions of rotation.		

	TITLE : GENERAL TECHNICAL REQUIREMENTS FOR LV MOTORS	SPECIFICATION NO. PE-SS-999-506-E101
		VOLUME NO. : II-B
		SECTION : D
		REV NO. : 00 DATE : 29/08/2005
		SHEET : 3 OF 4
4.4.	Motors shall not be provided with any electric or pneumatic operated external fan for cooling the motors.	
4.5	Frames shall be designed to avoid collection of moisture and all enclosures shall be provided with facility for drainage at the lowest point.	
4.6	In case Class 'F' insulation is provided for LV motors, temperature rise shall be limited to the limits applicable to Class 'B' insulation. In case of continuous operation at extreme voltage limits the temperature limits specified in table-1 of IS:325 shall not exceed by more than 10°C.	
4.7	Terminals and Terminal Boxes	
4.7.1	Terminals, terminal leads, terminal boxes, windings tails and associated equipment shall be suitable for connection to a supply system having a short circuit level, specified in the Data Sheet-A. Unless otherwise stated in Data Sheet-A, motors of rating 110 kW and above will be controlled by circuit breaker and below 110 kW by switch fuse-contactor. The terminal box of motors shall be designed for the fault current mentioned in data sheet "A".	
4.7.2	unless otherwise specified or approved, phase terminal boxes of horizontal motors shall be positioned on the left hand side of the motor when viewed from the non-driving end.	
4.7.3	Connections shall be such that when the supply leads R, Y & B are connected to motor terminals A B & C or U, V & W respectively, motor shall rotate in an anticlockwise direction when viewed from the non-driving end. Where such motors require clockwise rotation, the supply leads R, Y, B will be connected to motor terminals A, C, B or U W & V respectively.	
4.7.4	Permanently attached diagram and instruction plate made preferably of stainless steel shall be mounted inside terminal box cover giving the connection diagram for the desired direction of rotation and reverse rotation.	
4.7.5	Motor terminals and terminal leads shall be fully insulated with no bar live parts. Adequate space shall be available inside the terminal box so that no difficulty is encountered for terminating the cable specified in Data Sheet-A.	
4.7.6	Degree of protection for terminal boxes shall be IP 55 as per IS 4691.	
4.7.7	Separate terminal boxes shall be provided for space heaters.. If this is not possible in case of LV motors, the space heater terminals shall be adequately segregated from the main terminals in the main terminal box. Detachable gland plates with double compression brass glands shall be provided in terminal boxes.	
4.7.8.	Phase terminal boxes shall be suitable for 360 degree of rotation in steps of 90 degree for LV motors.	
4.7.9	Cable glands and cable lugs as per cable sizes specified in Data Sheet-A shall be included. Cable lugs shall be of tinned Copper, crimping type.	
4.8	Two separate earthing terminals suitable for connecting G.I. or MS strip grounding conductor of size given in Data Sheet-A shall be provided on opposite sides of motor frame. Each terminal box shall have a grounding terminal.	
4.9	General	

	TITLE : GENERAL TECHNICAL REQUIREMENTS FOR LV MOTORS	SPECIFICATION NO. PE-SS-999-506-E101
		VOLUME NO. : II-B
		SECTION : D
		REV NO. : 00 DATE : 29/08/2005
		SHEET : 4 OF 4
4.9.1 Motors provided for similar drives shall be interchangeable. 4.9.2 Suitable foundation bolts are to be supplied alongwith the motors. 4.9.3 Motors shall be provided with eye bolts, or other means to facilitate safe lifting if the weight is 20Kgs. and above. 4.9.4 Necessary fitments and accessories shall be provided on motors in accordance with the latest Indian Electricity rules 1956. 4.9.5 All motors rated above 30 kW shall be provided with space heaters to maintain the motor internal air temperature above the dew point. Unless otherwise specified, space heaters shall be suitable for a supply of 240V AC, single phase, 50 Hz. 4.9.6 Name plate with all particulars as per IS: 325 shall be provided 4.9.7 Unless otherwise specified, the colour of finish shall be grey to Shade No. 631 and 632 as per IS:5 for motors installed indoor and outdoor respectively. The paint shall be epoxy based and shall be suitable for withstanding specified site conditions. 5.0 INSPECTION AND TESTING 5.1 All materials, components and equipments covered under this specification shall be procured, manufactured, as per the BHEL standard quality plan No. PED-506-00-Q-006/0 and PED-506-00-Q-007/2 enclosed with this specification and which shall be complied. 5.2 LV motors of type-tested design shall be provided. Valid type test reports not more than 5 year shall be furnished. In the absence of these, type tests shall have to be conducted by manufacturer without any commercial implication to purchaser. 5.3 All motors shall be subjected to routine tests as per IS: 325 and as per BHEL standard quality plan. 5.4 Motors shall also be subjected to additional tests, if any, as mentioned in Data Sheet A. 6.0 DRAWINGS TO BE SUBMITTED AFTER AWARD OF CONTRACT a) OGA drawing showing the position of terminal boxes, earthing connections etc. b) Arrangement drawing of terminal boxes. c) Characteristic curves: (To be given for motor above 55 kW unless otherwise specified in Data Sheet). i) Current vs. time at rated voltage and minimum starting voltage. ii) Speed vs. time at rated voltage and minimum starting voltage. iii) Torque vs. speed at rated voltage and minimum voltage. For the motors with solid coupling the above curves i), ii), iii) to be furnished for the motors coupled with driven equipment. In case motor is coupled with mechanical equipment by fluid coupling, the above curves shall be furnished with and without coupling. iv) Thermal withstand curve under hot and cold conditions at rated voltage and max. permissible voltage.		



TITLE

LV MOTORS**DATA SHEET-A**

SPECIFICATION NO.

VOLUME

II B

SECTION

D

REV NO. 00

DATE 15.06.2015

SHEET 1 OF 1

- 1.0 Design ambient temperature : 50 °C
- 2.0 Maximum acceptable kW rating of LV motor: Below 175KW
- 3.0 Installation (Indoors/ Outdoors) : As required
- 4.0 Degree Of Protection (Indoor/Outdoor) : IP54/IP55
- 5.0 Type of Cooling : TEFC/CACA/TETV
- 6.0 Details of supply system
- a) Rated voltage (with variation) : 415V $\pm$ 10%
 - b) Rated frequency (with variation) : 50 Hz (Variation: +3% to -5%)
 - c) Combined voltage & freq. variation : 10% (absolute sum)
 - d) System fault level at rated voltage : 50 kA for 1 sec
 - e) Short time rating for terminal boxes
 - o 110kW & Above : 50 kA for 1 sec
(Breaker controlled)
 - o Below 110kW : 50 KA for 0.20 sec.
(Contactor controlled)
 - f) LV System grounding : Solidly
- 7.0 Class of insulation : Class 'F' with temp rise limited to class B
- 8.0 Minimum voltage for starting : 80% of rated voltage
(As percentage of rated voltage)
- 9.0 Power cables data : Shall be given during Detailed engg.
- 10.0 Earth Conductor Size & Material : Shall be given during Detailed engg.
- 11.0 Space heater supply : 240 V, 1 Φ , 50 Hz
- 12.0 Rating up to which Single phase motor : Acceptable upto 0.20 kW
- 13.0 Tests : As per Customer motor spec.(enclosed)
- 14.0 Energy efficient/ Flame proof motor : As per Customer spec. requirement
- 14.0 Makes : AS PER ANNEXURE-I

NOTE :**1. Also detail Customer spec. for Motors is to be referred as enclosed with technical spec.**

		QUALITY PLAN		CUSTOMER TSPGCL		PROJECT APPLICABLE FOR TYPES I TO V			SPECIFICATION :				
				BIDDER/ :		TITLE			NUMBER :				
				VENDOR		QUALITY PLAN			SPECIFICATION				
SHEET 1 OF 2		SYSTEM		ITEM AC ELECT. MOTORS BELOW 55KW (LV)			SECTION			VOLUME III			
SL. NO.	COMPONENT/OPERATION	CHARACTERISTICS CHECK	CAT.	TYPE/ METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORM	FORMAT OF RECORD	AGENCY			REMARKS	
									P	W	V		
1	2	3	4	5	6	7	8	9	10			11	
1.0	ASSEMBLY	1.WORKMANSHIP	MA	VISUAL	100%	MANUF'S SPEC	MANUF'S SPEC	-DO-	2	-	-		
		2.DIMENSIONS	MA	-DO-	-DO-	MFG. DRG./ MFG. SPEC.	MFG. DRG./ MFG. SPEC.	-DO-	2	-	-		
		3.CORRECTNESS COMPLETENESS TERMINATIONS/ MARKING/COLOUR CODE	MA	VISUAL	100%	MFG.SPEC./ RELEVANT IS	MFG.SPEC. RELEVANT IS	-DO-	2	-	-		
2.0	PAINTING	1.SHADE	MA	VISUAL	SAMPLE	MANUFR'S SPEC/BHEL SPEC./RELEVANT STANDARD	BHEL SPEC. SAME AS COL.7	LOG BOOK	2	-	-		
3.0	TESTS	1.ROUTINE TEST INCLUDING SPECIAL TEST AS PER BHEL SPEC.	MA	-DO-	100%	IS-325/ BHEL SPEC./ DATA SHEET	SAME AS COL.7	TEST REPORT	2	1			NOTE -1 & NOTE-3
		2.OVERALL DIMENSIONS & ORIENTATION	MA	MEASUREMENT & VISUAL	100%	APPROVED DRG/DATA SHEET	APPROVED DRG/DATA SHEET & RELEVANT IS	INSPN. REPORT	2	1	-		NOTE -1 & NOTE-3
BHEL			PARTICULARS			BIDDER/VENDOR							
			NAME										
			SIGNATURE										
			CUSTOMER TSPGCL		PROJECT 1 X 800 MW KOTHAGUDEM TPS				SPECIFICATION :				



		QUALITY PLAN				TITLE			NUMBER :			
		BIDDER/ : VENDOR				QUALITY PLAN NUMBER PED-506-00-Q-006, REV-01			SPECIFICATION :			
SHEET 2 OF 2		SYSTEM				ITEM AC ELECT. MOTORS BELOW 55KW (LV)			SECTION		VOLUME III	
SL. NO.	COMPONENT/OPERATION	CHARACTERISTICS CHECK	CAT.	TYPE/ METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORM	FORMAT OF RECORD	AGENCY			REMARKS
									P	W	V	
1	2	3	4	5	6	7	8	9	10			11
		3.NAMEPLATE DETAILS	MA	VISUAL	100%	IS-325 & DATA SHEET	IS-325 & DATA SHEET	INSPN. REPORT	2	1	-	
NOTES: 1 ROUTINE TESTS ON 100% MOTORS SHALL BE DONE BY THE VENDOR. HOWEVER, BHEL SHALL WITNESS ROUTINE TESTS ON RANDOM SAMPLES. THE SAMPLING PLAN SHALL BE MUTUALLY AGREED UPON 2 WHERE EVER CUSTOMER IS INVOLVED IN INSPECTION, (1) SHALL MEAN BHEL AND CUSTOMERS BOTH TOGETHER. 3 FOR EXHAUST/VENTILATION FAN MOTORS OF RATING UPTO 1.5KW , ONLY ROUTINE TEST CERTIFICATES SHALL BE FURNISHED FOR SCRUTINY.												
Legends for Inspection agency 1. BHEL/CUSTOMER 2. VENDOR (MOTOR MANUFACTURER) 3. SUB-VENDOR (RAW MATERIAL/COMPONENTS SUPPLIER) P. PERFORM W. WITNESS V. VERIFY												
BHEL			PARTICULARS		BIDDER/VENDOR			BIDDER'S/VENDORS COMPANY SEAL				
			NAME									
			SIGNATURE									
			DATE									



TITLE:

**TECHNICAL SPECIFICATION
SELF CLEANING STRAINER**

STANDARD TECHNICAL REQUIREMENTS

SPEC. NO.: **PE-TS-RC-165-N004**

SECTION: **II**

SUB-SECTION: **IIC**

REV. NO. **0** DATE **24.03.2017**

SHEET **1** OF **1**

SUB-SECTION - IIC

STANDARD TECHNICAL SPECIFICATION (C &I)



**SPECIFICATION FOR
LOCAL CONTROL CUM STARTER PANELS
FOR SELF CLEANING STRAINERS
(APPLICABLE FOR TYPES- I TO VI)**

SPECIFICATION NO.: PE-SS -999- 145 -054A	
VOLUME	II B
SECTION	D
REV. NO. 00	DATE : 28.03.2017
SHEET	1 OF 5

1.0 SCOPE

This specification covers the Design, Manufacture, Inspection and Testing at the manufacturer's works, proper packing for transportation and delivery to site, supervision, erection, and commissioning at site of Local Panels required for control and monitoring of the Self-cleaning strainers.

2.0 CODES AND STANDARDS

2.1 All the equipments specified herein shall comply with the requirements of the latest issue of the relevant National and International standards.

2.2 As a minimum requirement, the following standards shall be complied with:

- | | | | |
|----|--------------------------|---|---|
| a) | IS-6005 : 1998 | : | Code of practice for phosphating of iron and steel. |
| b) | IS-5 : 2007 | : | Colors for ready mixed paints and enamels. |
| c) | IS-1248:2003 | : | Direct Acting Indicating Analog Elec Measuring Instruments. |
| d) | IS/IEC 60947:Part 1:2004 | : | Low Voltage switchgear & control gear: Part-I (General Rules) |
| e) | IS-8828:1996 | : | Circuit breaker for household and similar installations. |
| f) | IS-13947 (Part-I):1993 | : | Low Voltage switchgear & control gear : Part-I (General Rules) |
| g) | ISA-18.1:1979 | : | Annunciator Sequences and Specification |
| h) | NFPA-496:2003 | : | Purged & Pressurized Enclosure for Electrical Equipment in Hazardous Locations. |

3.0 TECHNICAL REQUIREMENTS

3.1 Panel Construction

3.1.1 The local panels shall house the secondary instruments, annunciation system, Single loop controller, Control switches / push buttons, indicating lamps/LED cluster, relays, timers and other devices required for operation and monitoring of the equipment locally.

3.1.2 The panels shall be of free standing type either welded construction on angle iron (minimum section of 50 x 50 x 4 mm) structure or folded construction by sheet metal formation depending upon the equipments to be mounted on it. The panels shall be robustly built and stiffeners as necessary shall be provided.

3.1.3 The panel shall be suitably reinforced to ensure adequate support for all instruments mounted thereon. All welds on exposed panel surfaces shall be ground smooth.

3.1.4 The salient features of construction shall be:

Sheet material: Cold rolled sheet steel

Frame thickness: Not less than 3.0mm

Enclosure thickness: Not less than 2.5 mm for load bearing sections (Mounted with instruments)
1.6 mm for doors and not less than 2.0 mm for others

Panel Height: Not less than 2365 mm (Refer data sheet-A (No. PES-145A-DS1-0)

Gland plate thickness: 3.0mm

Base channel: ISMC 100 with anti-vibration mounting & foundation bolts.

3.1.5 The panel shall be provided with rear doors with integral lockable handle. The door when locked shall be held at minimum three places. The door width shall not be more than 550mm. The doors shall be provided with suitable stiffeners to prevent buckling. The handle shall be on the right side of the door. The door shall be removable type with concealed hinges to facilitate maintenance work. Suitable pocket inside the door shall be provided for keeping the drawings / documents. Double door shall be provided with suitable glass windows, as per the requirement.

3.1.6 Suitable neoprene gasket shall be provided on all doors and removable covers. Suitable ventilation system along with louvers shall be provided at bottom and top of the doors covered with removable wire mesh.



**SPECIFICATION FOR
LOCAL CONTROL CUM STARTER PANELS
FOR SELF CLEANING STAIRNERS
(APPLICABLE FOR TYPES- I TO VI)**

SPECIFICATION NO.: PE-SS -999- 145 -054A

VOLUME II B

SECTION D

REV. NO. 00

DATE : 28.03.2017

SHEET 2 OF 5

- 3.1.7 The class of protection shall be in accordance with IP-42 unless otherwise specified in the data sheet – A (No. PES-145-54A-DS1-0).
- 3.1.8 All steel surfaces shall be cleaned by sand / pellet blasting, treated for pickling, degreasing and phosphating etc. by seven tank method. The panel shall have a high quality finish and appearance. The panel shall be painted with two coats of primer followed by two coats of epoxy / synthetic enamel based final paint of color shade and finish as given in data sheet-A (No. PES-145A-DS1-0). Minimum thickness of the paint shall be 85 microns for external paint and 70 microns for internal paint.
- 3.1.9 The cable glands of the required size and type as given in data sheet-A (No. PES-145A-DS1-0) shall be supplied alongwith the Panel.
- 3.1.10 All operable and indicating devices shall be mounted on the front of the panel while aux. Relays / timers MCBs etc. required for realization of control logics shall be mounted on a mounting plate inside the panel. Auxiliary relays and timers etc. shall be grouped according to the control function.
No operable or indicating devices shall be mounted below 750 mm and above 1800 mm (w.r.t. finished ground level). The devices shall be located in such a way so as to ensure easy access for operation / maintenance.
- 3.1.11 Single / dual control power supply feeders of voltage class as specified in data sheet-A (No. PES-145A-DS1-0) shall be provided by the purchaser. In case redundant power supply feeders are provided then auto changeover unit shall be mounted on the panel are in the panel supplier's scope. Where DC control power supply is specified an additional 240V, 50 Hz AC supply feeder for powering of space heater and lighting shall be provided by the purchaser. Suitable arrangement shall be provided inside the panel to receive and terminate the power supply feeder(s). For this purpose MCBs of suitable current rating shall be provided by the vendor. A supervisory relay along with a pilot lamp to indicate control supply 'ON' shall be provided on the panel. Any other power supply required for the operation of the devices mounted in the panel shall be arranged by the vendor.
- 3.1.12 The internal wiring shall be carried out with 1100 volt grade PVC insulated copper multi strand wire / flexible of 1.5mm² size. AC & DC wires shall be kept separate from each other. Separate coloured wires to be used for AC and DC circuits. All wires shall be properly numbered and identified with ferrules as per the Control scheme / wiring diagram. Wires shall be routed and run through PVC troughs.
- 3.1.13 Terminal blocks shall be clip on type, 1100 volts grade. Separate terminal blocks shall be used for AC & DC circuits. The terminals shall be suitable for terminating 0.5 mm² to 2.5mm² external cables. The TB points in terminal block shall be cage clamp type / screw type. The terminal for ammeters shall be provided with removable links for shorting CTs. Each terminal strip shall be provided with identification strip. The terminal shall not be mounted below 250 mm height from finished floor. The panel shall have ten (20) percent spare terminal.
- 3.1.14 The interior of each panel shall be suitably illuminated through fluorescent lamps / tube lights with shrouded cover of minimum 15W operable on 240V 50 Hz AC power supply through panel door switch. A 15 Amp. 3-pin Power receptacle shall be provided.
- 3.1.15 Suitable space heaters operable on 240 Volts 50 Hz AC power system shall be provided at the panel bottom. These shall be designed to maintain the panel temperature five (5) deg. C above the ambient temperature during maintenance shutdown. Suitable isolating and control devices comprising of MCB, thermostat etc. shall be provided for the space heater.
- 3.1.16 The panel shall be provided with a copper earth bus of 25 x 6 mm size running throughout the width of the panel. It shall be terminated internally with 10 mm bolts at extreme ends for connection to; main station earth. The panel mounted equipments / devices shall be connected to earth bus through green coloured PVC insulated stranded copper conductor of 2.5 mm² size.
- 3.1.17 Local Panel shall be provided with main name plate of 150 mm x 40 mm size having inscription of 20 mm height. The individual devices on the panels shall be as provided with separate name plate with inscription of 3 mm height. The instrument / devices shall be provided with stick on label plates inside the panel. The material of the main and individual labels shall be three (3) ply 3 mm thick Traffolyte Sheet / 2 mm Anodised Aluminium Plate. The inscription shall be with white letters on black background on traffolyte sheet. The labels shall be fixed by self-tapping non-rusting screws.



**SPECIFICATION FOR
LOCAL CONTROL CUM STARTER PANELS
FOR SELF CLEANING STARINERS
(APPLICABLE FOR TYPES- I TO VI)**

SPECIFICATION NO.: PE-SS -999- 145 -054A

VOLUME II B

SECTION D

REV. NO. 00

DATE : 28.03.2017

SHEET 3 OF 5

3.1.18 Vendor shall furnish electric load and heat load list (in case panel is to be placed in ac environment) of each panel.

3.2 Hazardous Area Panel Requirement

3.2.1 The Local Panel located in hazardous area shall be pressurized as per NFPA-496 requirements to render it non-hazardous. Alarms shall be provided for local and remote annunciation when pressurisation falls below 2.5 mm of water column. Protection shall be of type Z of NFPA-496. It shall not be possible to switch ON the power of purged section unless it is purged as per the recommendation of NFPA-496. Vendor must provide a protective device on the panel to protect the panel from over pressurisation.

3.2.2 Vendor shall supply pressurisation kit consisting of valves, restriction orifices, dual filter regulation, pressure gauges, pressure switches, rotameter etc. Pressurisation kit shall be surface mounting on a metal board and located outside the local panel. Pressurisation kit shall further consist of solenoid valve flow switch, timer blow off safety device etc., so as to make purging fully automatic. However final start shall be manual. Panel protection against over pressure to be provided as per NFPA-496.

3.2.3 Pressurised local control panel pressurization kit assembly design shall provide minimum leakage flow through the Local Control Panel. Panel venting shall be as per NFPA-496.

3.2.4 All components in the local panel like indicating instruments, push buttons switches, lamps etc., which are required to be energized without panel pressurization or before completion of purge cycle shall be explosion proof as per NEMA-7 & suitable for area classification.

3.2.5 All push buttons etc. requiring frequent operation during machine running shall have good positive sealing. Weatherproof housing or cover to be provided wherever necessary. Vendor shall provide pressurisation bypass switch outside explosion proof enclosure of pressurized panel with lamp indication. This shall be used only during maintenance. All hinges, screws, other non-painted metallic parts shall be of stainless steel material.

3.2.6 Provision to switch off manually all types of power shall be provided in the panel. In addition, it shall also be possible to switch off power circuits / components which are powered from motor control centre or control room manually in case of pressurization failure. All such cables from MCC and main control room shall be terminated in explosion proof boxes (NEMA-7).

3.3 Control & Monitoring devices

3.3.1 Instruments like Indicators, recorders, single loop controllers etc. as applicable and specified elsewhere for the plant / equipment shall be supplied and mounted on the panel.

3.3.2 Alarm Annunciator System

It shall be solid state discrete facia type having a sequence of ISA-S18.1A or as specified, opaque facia windows of 70 mm x 50 mm size, having two (2) lamps per window, and hooter of 10W, and provision for repeat group alarm at remote. The annunciator shall be provided with ten (10) percent spare windows or minimum two (2) windows along with electronics.

3.3.3 Relays

The relays shall be electromagnetic type suitable for specified control supply. Its contact configuration and rating shall be suitable for the specified control function. However minimum contact rating shall be 5 Amp AC & 2 Amp DC as applicable. There shall be ten (10) percent spare contacts.

3.3.4 Timers

The timers shall be electronic type suitable for specified control supply. Its contact configuration and rating shall be suitable for the specified control function. However, minimum contact rating shall be 5 Amp AC & 2 Amp DC as applicable.

3.3.5 Control / Selector Switches

Switches shall be Rotary Cam type with minimum of 5 Amps AC & 2 Amp DC continuous current rating. Selector switches shall be stay put type while control switches shall be spring-return-to-neutral type. Contact configuration and rating shall be as per the control function requirement. The switches shall be



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lockable type wherever specified. Each switch shall be provided with engraved plates indicating the switch position / functions.

3.3.6 Push Buttons / Indicating Lights

The push buttons shall be momentary action self-resetting type, however stop P.B. for unidirectional drives shall be provided with manual reset facility. Its contact configuration & rating shall be as required for the control function but minimum 2 NO + 2 NC of 5 Amp. AC rating. It shall have round coloured projecting tab and engraved escutcheon plate / inscription plate. Colour coding of push buttons shall be as under:

RED	Motor OFF / Valve CLOSE	YELLOW	Alarm acknowledge	Left Hand Side
GREEN	Motor ON / Valve OPEN	BLACK	Lamp test	Right Hand Side

Indicating lights shall be suitable for direct connections across specified power supplies. It shall be fitted with built in resistance to prevent circuit tripping on shorting of lamp filament. It shall be fitted with LED cluster type lamp replaceable from front.

GREEN	Motor OFF / Valve CLOSED condition	AMBER	Motor tripped	Left Hand Side
RED	Motor ON / Valve OPEN condition	WHITE	Normal / healthy	Right Hand Side

3.3.7 Ammeters

Ammeter shall be 96 x 96 mm size, 90 deg. deflection, 1.5% accuracy, 1 Amp. CT operated or with 4-20mA input and Flush mounting type as called for in the data sheet-A (No. PES-145-54A-DS1-0). Ammeters for motors shall have six (6) times folded scale at upper end to enable motor starting current indication

3.3.8 Miniature Circuit Breaker (MCB)

These shall be instantaneous magnetic trip type for short circuit in addition to current time inverse delayed thermal trip feature for over current protection. The housing of MCB shall be made of non-ignitable, high impact material. It shall have minimum short circuit rating of 9 KA for AC Voltages and 4 KA for DC Voltages.

3.3.9 Makes of various instruments / devices shall be as given below

1.	Alarm Annunciators	:	Procon / IIC
2.	Ammeters	:	AEP / IMP
3.	Control / Selector Switches	:	Alsthom / Kaycee / Siemens / L&T
4.	Push Buttons / Indicating Lamps	:	Siemens / L&T / Teknic / Alsthom
5.	Auxiliary Relays	:	Jyoti / Siemens / L&T / OEN
6.	Timers	:	L&T / Alsthom / Bhartiya Cutler Hammer
7.	MCBs	:	S&S Power Engg. / Indo Asian / MDS
8.	Terminal Blocks	:	Jyoti / Elmex

4.0 TESTING AND INSPECTION

4.1

4.2 The bidder shall adopt suitable quality assurance program to ensure that the equipments offered will meet the specification requirements in full.

4.3 BHEL's standard Quality Plan for LCP is enclosed with the specification. The bidder shall furnish his acceptance to BHEL's QP and submit the signed and stamped copy of QP along with the offer.

4.3 The vendor shall conduct the following tests as a minimum requirement:

4.3.1 Routine Tests

1. High Voltage (H.V.)
2. Insulation Resistance (I.R.)
3. Functional
- 4.



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4.3.2 Type Tests

1. Enclosure Class Test

5.0 SPARES AND CONSUMABLES

5.1 Commissioning Spares and consumables

The bidder shall supply all commissioning spares and consumables 'as required' during Start-up, as part of the main equipment supply.

5.2. Mandatory Spares

The bidder shall offer alongwith main offer, the Mandatory Spares as specified elsewhere in the specification. The Mandatory Spares offered shall be of the same make and type as the main equipment.

5.3. Recommended Spares

The bidder shall furnish a list of Recommended Spares indicating the normal service expectancy period and frequency of replacement; quantities recommended for 3 years operation alongwith unit rate against each item to enable BHEL/BHEL's Customer to place a separate order later, if required.

6.0 DRAWINGS AND DOCUMENTS

6.1 The bidder shall furnish the following documents in required number of copies along with the bid :

1. Data Sheet no. PES-145A-DS1-0
2. General Arrangement Drawing.
3. Catalogue and technical information for instruments and devices.
4. Quality Plan.

6.2 The vendor shall furnish the following documents in required number as agreed after the award of contract:

1. Data Sheet No. PES-145A-DS2-0
2. GA Drawing indicating layout of instruments, construction details, foundation details, cable gland plate alongwith cable glands and all details mentioned in this specification.
3. Control Schematic Diagram along with grouping of different terminals for various functions.
4. Catalogue and technical information for instruments and devices with selected options clearly marked.
5. O&M Manuals.
6. "As Built" Drawing.
7. CDs.

7.0 MARKING AND PACKING

7.1 Panel with all instruments / devices mounted on it shall be suitably packed & protected for the entire period of dispatch, storage and erection against impact, abrasion, corrosion, incidental damage due to vermin, sunlight, high temperature, rain moisture, humidity, dust, sea-water spray (where applicable) as well as rough handling and delays in Transit and storage in open.

8.0 APPLICABLE DATA SHEET FORMS

This document shall be read with one or more of the following data sheet forms :

- | | | |
|-----------------------------------|---|-------------------------------|
| - Data sheet A&B for Local Panels | : | Data sheet no. PES-145A-DS1-0 |
| - Data sheet C for Local Panels | : | Data sheet no. PES-145A-DS2-0 |

QUALITY PLANS FOR

- 1. LOCAL CONTROL CUM STARTER PANEL**
- 2. INSTRUMENTS**



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STANDARD QUALITY PLAN FOR LOCAL CONTROL CUM STARTER PANEL

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Sl. No.	Component / operation	Characteristics Checked	* Category	Type/Method of Check	Extent of Check	Reference documents	Acceptance Norms	Format of Records	Agency ^s			Remarks
									P	W	V	
1.0	INCOMING Sheet Steel (CRCA & HR)	1. Chemical Composition	MA	Chemical analysis	Sample	IS:1079 IS:513	IS:1079 IS:513	Test Certificate	3	---	2	
		2. Bend Test	CR	Mech. test	Sample	IS:1079 IS:513	IS:1079 IS:513	Log Book	2	---	---	
		3. Surface finish	MA	Visual	100%	Factory Standard / Sample	Factory Standard / Sample	Log Book	2	---	---	
		4. Waviness	MA	Visual	100%	Factory Standard	No Waviness	Log Book	2	---	---	
		5. Thickness	MA	Measurement	100%	BHEL Spec.	BHEL Spec.	Log Book	2	---	---	
		6. Mill marking	MA	Visual	100%	Factory Standard	Factory Standard	Log Book	2	---	1	
2.0	Flats / Angles / Channels	1. Dimensions	MA	Measurement	Sample	IS:2062	IS:2062	Log Book	2	---	---	
		2. Surface Defects	MA	Visual	100%	Factory Standard / Sample	Factory Standard / Sample	Log Book	2	---	---	
		3. Straightness	MA	Measurement	100%	Factory Std.	Factory Std.	Log Book	2	---	---	
		4. Mill marking	MA	Visual	100%	IS:2062	IS:2062	Log Book	2	---	1	
3.0	Cables / Wires	1. Visual / Surface defects	MA	Visual	100%	BHEL Spec. and IS:1554 or IS:694	BHEL Spec. and IS:1554 or IS:694	Log Book	2	---	---	
		2. IR and HV	MA	Electrical	100%	BHEL Spec. and IS:1554 or IS:694	BHEL Spec. and IS:1554 or IS:694	Log Book	2	---	---	

LEGEND: * CR - Critical characteristics
MA - Major characteristics
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									P	W	V	
		3. Conductor a) Resistance b) Size c) Sheet colour	MA MA MA	Electrical Measurement Visual	100% 100% 100%	BHEL Spec. and IS:1554 or IS:694	BHEL Spec. and IS:1554 or IS:694	Log Book	2	---	---	
		4. Type / Routine Test Certificates	MA	Verification	100%	BHEL Spec. and IS:1554 or IS:694	BHEL Spec. and IS:1554 or IS:694	Log Book	3	---	2	
4.0	Electrical Components like Annunciator Transformers Lamps Switches PBs Contactors Relays Timers Space Heaters Thermostat Indicating meters etc.	1. Verification at make and Type	CR	Visual	Sample	BHEL Spec. and BOM	BHEL Spec. and BOM	Log Book	2	---	---	+ for relay & contactors only @ for all components except relays & contactors.
		2. Verification of Test Certificates	CR	Scrutiny of Type / Routine T.Cs.	100%	Relevant IS	Relevant IS	Log Book	2	---	---	
		3. Operation / Functional check	CR	Electrical	Sample+ 100%@	Relevant Indian Std & Catalogue	Relevant Indian Std & Catalogue	Log Book	2	---	---	
		4. I.R.	MA	Electrical	100%	Relevant Indian Std & Catalogue	Relevant Indian Std & Catalogue	Log Book	2	---	---	
		5. H.V.	MA	Electrical	100%	Relevant Indian Std & Catalogue	Relevant Indian Std & Catalogue	Log Book	2	---	---	
		6. Calibration	MA	Electrical	100%	Relevant Indian Std & Catalogue	Relevant Indian Std & Catalogue	Log Book	2	---	1	
		7. Pick up / Drop off Voltage	MA	Electrical	100%	Relevant Indian Std & Catalogue	Relevant Indian Std & Catalogue	Log Book	2	---	---	

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									P	W	V	
5.0	Misc. Components like Gaskets, Terminal Blocks etc.	1. Verification of Type / Make	MA	Visual	Sample	BHEL Spec. & Mfrs. Catalogue	BHEL Spec. & Mfrs. Catalogue	Log Book	2	---	---	
		2. Surface defects	MA	Visual	Sample	BHEL Spec. & Mfrs. Catalogue	BHEL Spec. & Mfrs. Catalogue	Log Book	2	---	---	
		3. IR / HV on Terminal Blocks	MA	Electrical	Sample	BHEL Spec. & Mfrs. Catalogue	BHEL Spec. & Mfrs. Catalogue	Log Book	2	---	---	
6.0	IN PROCESS Blanking / Bending / Forming	1. Dimensions	MI	Measurement	100%	Approved Mfr. drgs.	Approved Mfr. drgs.	Log Book	2	---	---	
		2. Surface defects after bending	MA	Visual	100%	Factory Standard	Factory Standard	Log Book	2	---	---	
7.0	Nibbling / Punching	1. Cutout Sizes	MI	Measurement	100%	Approved Mfr. drgs.	Approved Mfr. drgs.	Log Book	2	---	---	
		2. Deburring	MA	Visual	100%	Approved Mfr. drgs.	Approved Mfr. drgs.	Log Book	2	---	---	
8.0	ASSEMBLY Frame Assembly & Sheet fixing	1. Dimensions	MA	Measurement	100%	Approved drg. / Mfr. Standards	Approved drg. / Mfr. Standards	Log Book	2	---	2	
		2. Alignment	MA	Measurement	100%	Approved drg. / Mfr. Standards	Approved drg. / Mfr. Standards	Log Book	2	---	2	
		3. Welding Quality	MA	Visual	100%	Approved drg. / Mfr. Standards	Approved drg. / Mfr. Standards	Log Book	2	---	2	
		4. Surface defects	MA	Visual	100%	Approved drg. / Mfr. Standards	Approved drg. / Mfr. Standards	Log Book	2	---	2	

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									P	W	V	
9.0	Pre-treatment and Painting	1. Pretreatment Process	MA	Visual	100%	Factory Standard & IS: 6005	Factory Standard & IS: 6005	Log Book	2	---	1	
		2. Process parameters like bath temp. concentration etc.	MA	Measurement	Periodic	Factory Standard & IS: 6005	Factory Standard & IS: 6005	Log Book	2	---	1	
		3. Dipping / Removal Time	MA	Measurement	100%	Factory Standard & IS: 6005	Factory Standard & IS: 6005	Log Book	2	---	1	
		4. Surface quality after every dip	MA	Visual	100%	Factory Standard & IS: 6005	Factory Standard & IS: 6005	Log Book	2	---	1	
		5. Primer after phosphating	MA	Visual, Thickness	100%	Factory Standard & IS: 6005	Factory Standard & IS: 6005	Log Book	2	---	1	
		6. Putty Application & Rubbing after primer	MA	Visual	100%	Factory Standard & IS: 6005	Factory Standard & IS: 6005	Log Book	2	---	1	
		7. Paint first coat	MA	Visual, Thickness	100%	Factory Standard & IS: 6005	Factory Standard & IS: 6005	Log Book	2	---	1	
		8. Putty Application and Rubbing after first coat of paint	MA	Visual	100%	Factory Standard & IS: 6005	Factory Standard & IS: 6005	Log Book	2	---	1	
		9. Paint second coat	MA	Visual, Thickness, Scratch test Colour adhesion	100%	Factory Standard & IS: 6005	Factory Standard & IS: 6005	Log Book	2	---	1	

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Sl. No.	Component / operation	Characteristics Checked	* Category	Type/Method of Check	Extent of Check	Reference documents	Acceptance Norms	Format of Records	Agency ^{\$}			Remarks
									P	W	V	
10.	Panel Wiring	1. Wiring Layout	MA	Visual	100%	Approved drgs. & Specs.	Approved drgs. & Specs.	Log Book	2	---	---	
		2. Wiring Termination (Crimped Lugs)	MA	Visual	100%	Approved drgs. & Specs.	Approved drgs. & Specs.	Log Book	2	---	---	
		3. Ferrule numbers	MA	Visual	100%	Approved drgs. & Specs.	Approved drgs. & Specs.	Log Book	2	---	---	
		4. Colour of wiring	MA	Visual	100%	Approved drgs. & Specs.	Approved drgs. & Specs.	Log Book	2	---	1	
		5. Size of Conductor	MA	Measurement	100%	Approved drgs. & Specs.	Approved drgs. & Specs.	Log Book	2	---	1	
11.	Component Mounting	1. Correct components	MA	Visual	100%	Approved drgs., Specs. & BOM	Approved drgs., Specs. & BOM	Log Book	2	---	---	
		2. Fixing	MA	Visual	100%	Approved drgs., Specs. & BOM	Approved drgs., Specs. & BOM	Log Book	2	---	---	
12.	FINAL Final Inspection	1. Workmanship	MA	Visual	100%	Factory Standard	Factory Standard	Inspection Report	2	1	1	At Random by BHEL, based on 100 % internal test reports by Mfr.
		2. Component layout (neatness, accessibility & safety) Mounting / Proper fixing of all components	MA	Visual	100%	BHEL approved drg. / Spec.	BHEL approved drg. / Spec.	Inspection Report	2	1	1	
		3. Components identification Marking / Name plates	MA	Visual	100%	BHEL approved drg. / Spec.	BHEL approved drg. / Spec.	Inspection Report	2	1	1	

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Sl. No.	Component / operation	Characteristics Checked	* Category	Type/Method of Check	Extent of Check	Reference documents	Acceptance Norms	Format of Records	Agency ^s			Remarks
									P	W	V	
		5. Dimensions	MA	Measurement	100%	BHEL approved drg. / Spec., BOM	BHEL approved drg. / Spec., BOM	Inspection Report	2	1	1	At Random by BHEL, based on 100 % internal test reports by Mfr.
		6. Door functioning	MA	Functional	100%	BHEL approved drg. / Spec.	BHEL approved drg. / Spec.	Inspection Report	2	1	1	
		7. Paint Shade	CR	Visual	100%	BHEL approved drg. / Spec.	BHEL approved drg. / Spec.	Inspection Report	2	1	1	
		8. Paint Thickness	CR	Measurement	100%	BHEL approved drg. / Spec.	BHEL approved drg. / Spec.	Inspection Report	2	1	1	
		9. Workmanship of Gaskets	MA	Visual	100%	Factory Standard	Factory Standard	Inspection Report	2	1	1	
		10. Wiring Layout	MA	Visual	100%	BHEL approved drg.	BHEL approved drg.	Inspection Report	2	1	1	
		11. Wire Termination	MA	Pulling manually	Sample	-----	Firm termination	Inspection Report	2	1	1	
		12. Continuity	MA	Electrical	100%	-----	Continuity OK	Inspection Report	2	1	1	

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Sl. No.	Component / operation	Characteristics Checked	* Category	Type/Method of Check	Extent of Check	Reference documents	Acceptance Norms	Format of Records	Agency ^s			Remarks
									P	W	V	
13.	TYPE TEST	Degree of Protection	CR	Mech. Protection	Sample	BHEL approved spec., drg relevant IS-13947 Part-1, IS-2148.	BHEL approved spec., drg relevant IS-13947 Part-1, IS-2148.	Type Test Certificate	3	---	1	
14	ROUTINE TEST	IR before & after HV Test	CR	Electrical	100%	BHEL approved spec., drg., BOM & relevant IS.	BHEL approved spec., drg., BOM & relevant IS.	Test Report	2	1	1	
15	FUNCTIONAL TEST	1. Control Logic Operation	CR	Electrical	100%	BHEL approved spec. / drg.	BHEL approved spec. / drg.	Inspection Report	2	1	1	
		2. Instrument Calibration	CR	Electrical	10%	BHEL approved spec. / drg.	BHEL approved spec. / drg.	Inspection Report	2	1	1	
		3. Temperature rise	CR	Electrical	100%	BHEL approved spec/drg. & relevant IS.	BHEL approved spec/drg & relevant IS.	Inspection Report	2	1	1	

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STANDARD CHECK LIST FOR C&I INSTRUMENTS (for Maux Pkgs)

CHECK LIST FOR TRANSMITTER

Sl. No.	Test / Checks	Quantum of check	Reference Doc. / Acceptance Norms	Agency **			Remarks
				M	C	B	
1	CHECKS FOR	SEE NOTE-1 BELOW	APPROVED SPEC./ DATA SHEETS	P	W	V	
	VISUAL.						
	MODEL/TAG No						
2	PROCESS CONNECTION			P	W	V	
3	ACCURACY			P	W	V	
4	REPEATABILITY			P	W	V	
5	HYSTERESIS			P	W	V	
6	EFFECT OF TEMP VARIATION ON ACCURACY	P		W	V		
7	SPAN / ZERO ADJUSTMENT	ONE / TYPE		P	W	V	
8	EFFECT OF SUPPLY VOLTAGE VARIATION			P	W	V	
9	EFFECT OF LOADING (500 OHM METERS)			P	W	V	
10	HIGH PRESSURE TEST	SEE NOTE-1 BELOW		P	W	V	
11	BURN-IN TEST	ONE / TYPE		P	W	V	
12	DEGREE OF PROTECTION			P	W	V	
13	ACCESSORIES AS APPLICABLE	SEE NOTE-1 BELOW		V	V	V	

Legend :

** M = Manufacturer / Sub-contractor, C = Contractor / Nominated Inspecting Agency, B = BHEL, P = Perform, W = Witness, V = Verification

Note :

- Quantum of check shall be as below :
100 % - By Manufacturer
- Manufacturer to maintain calibrated instrument having better accuracy than the item under test. Inspecting engineer shall check the same.
- When material corelation are not available manufacturer's compliance to be provided.
- Contractor to provide compliance certificate for tests/checks verifid by contractor and submit the same alongwith test certificates to be verified by BHEL.



STANDARD CHECK LIST FOR C&I INSTRUMENTS (for Maux Pkgs)

CHECK LIST FOR PRESSURE & DP GAUGE

Sl. No.	Test / Checks	Quantum of check	Reference Doc. / Acceptance Norms	Agency **			Remarks
				M	C	B	
1	CHECK FOR	SEE NOTE-1 BELOW	APPROVED SPEC./ DATA SHEETS	P	W	V	
	SENSOR TYPE						
	DIAL SIZE						
	MODEL NO/TAG NO						
	RANGE/SCALE						
	SWITCH CONTACT RATING & NOS.						
	END CONNECTION						
2	CALIBRATION			P	W	V	
	ACCURACY						
	REPEATABILITY						
	SET POINT ADJUSTMENT						
3	OVER PRESSURE & LEAK TEST			P	W	V	
4	OPERATION OF PRESSURE. RELIEF DEVICE	ONE		P	W	V	
5	REVIEW OF TC FOR	FOR LOT		V	V	V	
	MATERIALS OF SENSOR						
	MOVEMENT						
	PROCESS CONNECTION						
	HOUSING						
6	REVIEW OF TC FOR DEGREE OF PROTECTION	TYPE TEST	V	V	V		
7	ACCESSORIES AS APPLICABLE	SEE NOTE-1 BELOW	V	V	V		

Legend :

** M = Manufacturer / Sub-contractor, C = Contractor / Nominated Inspecting Agency, B = BHEL, P = Perform, W = Witness, V = Verification

Note :

- Quantum of check shall be as below :
100 % - By Manufacturer
- Manufacturer to maintain calibrated instrument having better accuracy than the item under test. Inspecting engineer shall check the same.
- Manufacturer to carry out ROUTINE TEST on 100 %.
- When material correlation is not available, MFR's compliance to be provided
- Contractor to provide compliance certificate for tests/checks verified by contractor and submit the same alongwith test certificates to be verified by BHEL.



STANDARD CHECK LIST FOR C&I INSTRUMENTS (for Maux Pkgs)

CHECK LIST FOR ANNUNCIATORS

Sl. No.	Test / Checks	Quantum of check	Reference Doc. / Acceptance Norms	Agency **			Remarks
				M	C	B	
1	CHECK FOR	SEE NOTE-1 BELOW	APPROVED SPEC./ DATA SHEETS	P	W	V	
	TYPE/ MODEL						
	DIMENSIONS OF HARDWARE						
	MODULARITY						
	SEQUENCE						
	FACIA DETAILS						
2	FUNCTIONAL TEST	100%		P	W	V	
3	IMMUNE TO STEP VARIATIONS IN THE POWER SUPPLY	SEE NOTE-1 BELOW		P	W	V	
4	DEGREE OF PROTECTION FOR ENCLOSURE	TYPE TEST		P	W	V	
5	I/R CHECK	SEE NOTE-1 BELOW		P	W	V	
6	RESPONSE			P	W	V	

Legend :

** M = Manufacturer / Sub-contractor, C = Contractor / Nominated Inspecting Agency, B = BHEL, P = Perform, W = Witness, V = Verification

Note :

- Quantum of check shall be as below :
100 % - By Manufacturer
- Manufacturer to maintain calibrated instrument having better accuracy than the item under test. Inspecting engineer shall check the same.
- Manufacturer to carry out ROUTINE TEST on 100 %.
- Contractor to provide compliance certificate for tests/checks verified by contractor and submit the same alongwith test certificates to be verified by BHEL.



TITLE:

**TECHNICAL SPECIFICATION
SELF CLEANING STRAINER**

STANDARD TECHNICAL REQUIREMENTS

SPEC. NO.: **PE-TS-RC-165-N004**

SECTION: **III**

SUB-SECTION:

REV. NO. 0 DATE 24.03.2017

SHEET 1 OF 1

SECTION III

DOCUMENTS TO BE SUBMITTED BY BIDDER

	TITLE : SCHEDULE OF PERFORMANCE GUARANTEES FOR SELF CLEANING STRAINER (SCS)	TECHNICAL SPECIFICATION NO. PE-TS- RC-165-N004
		SECTION : III
		SUB SECTION : IIIA
		Sheet 1 of 1 Date- 26.03.2017

S.NO.	DESCRIPTION	UNITS	1x250 MW ROURKELA PP-II EXPANSION
1.	Pressure drop across the SCS (i.e. between inlet & outlet nozzle) under clean condition and Normal flow condition	MWC	

PARTICULARS OF BIDDER/ AUTHORISED REPRESENTATIVE				
NAME	DESIGNATION	SIGNATURE	DATE	
				COMPANY SEAL

	TITLE : COMPLIANCE CERTIFICATE FOR SELF CLEANING STRAINER	SPEC. NO.	SPEC. NO. PE-TS- RC-165- N004
		DATE:	26.03.2017
		SHEET :	1 OF 2

COMPLIANCE CERTIFICATE

The bidder shall confirm compliance with following by signing/ stamping this compliance certificate and furnish same with the offer.

- a) The scope of supply, technical details, construction features, design parameters etc. shall be as per technical specification & there are no exclusions with regard to same.
- b) There are no other deviations w.r.t. specification other than those furnished in the 'Schedule of Deviations'. Any other deviation, stated or implied, taken elsewhere in the offer stands withdrawn unless specifically brought out in the 'Schedule of Deviations'
- c) Bidder shall submit QP in the event of order based on the guidelines given in the specification & QP enclosed therein. QP will be subject to BHEL/ Customer/Customer's Consultant approval and customer hold points for inspection/ testing shall be marked in the QP at the contract stage. Inspection/ testing shall be witnessed as per same apart from review of various test certificates/ Inspection records etc. Charges for 3rd party inspection (TUV/ equivalent) for imported components wherever required shall be included by bidder in the base price itself.
- d) Any drawing/ document/ data-sheet/ calculation/ Quality plan/ Instrumentation etc. submitted along with the offer shall be considered for reference only, same shall be subject to BHEL/ Customer/Customer's Consultant approval in the event of order.
- e) The offered materials shall be either equivalent or superior to those specified in the specification. For components where materials are not specified, same shall be suitable for intended duty, all materials shall be subject to approval in the event of order.
- f) The commissioning spares shall be supplied on 'As Required Basis' and to be supplied at the time of commissioning of SCS & prices for same included in the base price itself. Prices for special tools & tackles, if any, shall also be included in the base price. Recommended spares for 3 years shall be quoted separately with price indicated separately.
- g) Charges for Installation Checks, Commissioning of equipment, Trial run and Performance Testing at site shall be included by bidder in the base price itself.
- h) The main flanges for SCS shall be suitable for the forces and moments as per the specification.
- i) The hydrostatic test pressure shall be 1.5 times the design pressure.
- j) All sub - vendors shall be subject to BHEL/ Customer/Customer's Consultant approval in the event of order.
- k) The Performance guarantees of equipment shall stand valid till the satisfactory completion of performance testing & its acceptance by BHEL/ Customer/Customer's Consultant.
- l) The orientation of piping around SCS shall be finalised during detailed Engg.
- m) Electrical/ C&I :
 - All selected motor ratings have minimum 15 % margin over maximum continuous demand of the driven equipment including voltage and frequency variations, temperature rise and other factors.
 - Supply of electrical viz. LT power cables, instrumentation and control cables, cable glands, lugs, cable trays etc. shall be as per specification. Their erection shall be done by BHEL

	TITLE : COMPLIANCE CERTIFICATE FOR SELF CLEANING STRAINER	SPEC. NO. DATE: SHEET :	SPEC. NO. PE-TS- RC-165- N004 26.03.2017 2 OF 2
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- The junction boxes for termination of DPT/ DPS/ Actuator LS/ solenoid valves are included in bidder's scope. The instrumentation cable and cabling from instruments/ actuators to junction boxes is also included in bidder's scope.
- Valve actuators and controls shall be provided as specified in Data Sheet-A and Project specific requirements as specified in Section I-B & Section I-C.
- Alarms/ annunciations/ instruments shall be finalised during detailed engineering in the event of order which shall be subject to BHEL/ Customer/Customer's Consultant approval and shall be without any commercial implications to BHEL.
- Switch gear panel should have suitable arrangement like bus coupler for providing redundancy to incoming supply feeder.

[illegible]

	TITLE :	SPECIFICATION NO.
	DATA SHEET - B	VOLUME : III - B
	SELF - CLEANING FILTER	SECTION : B
	(Backwash Type)	REV. NO. 00 DATE :
		SHEET 1 OF 3

SL.NO.	DESCRIPTION	UNIT	DATA/ PARTICULARS
1.0	GENERAL		
1.1	No. of filters required	Nos.	
1.2	Inlet connection	mm Nb	
1.3	Outlet connection	mm Nb	
1.4	Filter type/ duty		
1.5	Location		
1.6	Liquid handled		
2.0	DESIGN DATA		
2.1	Operating pressure	Bar (g)	
2.2	Design pressure	Bar (g)	
2.3	Design temperature	Deg. C	
2.4	Flow rate through filter		
	a) Normal		
	b) Maximum		
2.5	Design differential pressure for filter section/ screen	Bar (g)	
2.6	Max. Size of solid particle likely to enter the filter	mm	
2.7	Type of suspended matter likely to enter the filter		
2.8	Differential pressure measuring system set pressure		
	• For initiating flushing/ backwashing	mbar	
	• For alarm/ annunciation	mbar	
2.9	Filter section/ screen perforation size	mm	
3.0	GUARANTEED PERFORMANCE REQUIREMENT		

	TITLE :	SPECIFICATION NO.
	DATA SHEET - B	VOLUME : III - B
	SELF - CLEANING FILTER	SECTION : B
	(Backwash Type)	REV. NO. 00 DATE :
		SHEET 2 OF 3

SL.NO.	DESCRIPTION	UNIT	DATA/ PARTICULARS
--------	-------------	------	-------------------

3.1	Pressure drop across the filter (i.e. between inlet and outlet connection)	mbar	
-----	--	------	--

a) Clean condition

b) Partially (50%) choked condition

c) During flushing operation

d) After flushing operation

3.2	Debris discharge flow during flushing period		
-----	--	--	--

3.3	Flushing period	Minutes	
-----	-----------------	---------	--

3.4	Debris/ sludge removal capacity	m ³ /hr	
-----	---------------------------------	--------------------	--

4.0	MATERIALS OF CONSTRUCTION		
-----	----------------------------------	--	--

4.1	Filter body/ housing		
-----	----------------------	--	--

4.2	Filter screen/ section		
-----	------------------------	--	--

4.3	Supporting cage		
-----	-----------------	--	--

4.4	Differential measuring system		
-----	-------------------------------	--	--

4.5	Flushing/ backwashing unit		
-----	----------------------------	--	--

4.6	Backwash rotor shoes		
-----	----------------------	--	--

4.7	Internal hardware		
-----	-------------------	--	--

4.8	Pipes		
-----	-------	--	--

4.9	Shaft		
-----	-------	--	--

5.0	COUNTER FLANGES		
-----	------------------------	--	--

5.1	Materials :		
-----	-------------	--	--

a) Flanges

b) Bolts & Nuts

c) Gaskets

5.2	Drilling Standard		
-----	-------------------	--	--

	TITLE :	SPECIFICATION NO.
	DATA SHEET - B	VOLUME : III - B
	SELF - CLEANING FILTER	SECTION : B
	(Backwash Type)	REV. NO. 00 DATE :
		SHEET 3 OF 3

SL.NO.	DESCRIPTION	UNIT	DATA/ PARTICULARS
--------	-------------	------	-------------------

6.0 PAINTING

6.1 External Surface

1. Surface preparation
2. Primer
3. Final paint

6.2 Internal Surface

- a) Surface preparation
- a) Primer
- b) Final paint

7.0 SHOP TEST

7.1 Hydrostatic test

- a) Test Pressure bar (g)
- b) Test duration min.

7.2 Leakage test

- a) Test Pressure bar (g)
- b) Test duration min.

	TITLE MOTOR DATA SHEET - C	SPECIFICATION NO.	
		VOLUME	II B
		SECTION D	
		REV NO. 00 DATE 29/08/2005	
		SHEET	2 OF 2

S. No.	Description	Data to be filled by successful bidder
	c) At starting	
C.	Constructional Features	
1	Method of connection of motor driven equipment	
2	Applicable Standard	
3	DOP of Enclosure	
4	Method of cooling	
5	Class of insulation	
6	Main terminal box	
	a) Type	
	b) Power Cable details (Conductor, size, armour/unarmour)	
	c) Cable Gland & lugs details (Size, type & material)	
	d) Permissible Fault level (kArms & duration in sec)	
7	Space heater details (Voltage & watts)	
8	Flame proof motor details (if applicable)	
	a) Enclosure	
	b) suitability for hazardous area	
	i Zone	O / I / II
	ii Group	IIA / IIB / IIC
9	No. of Stator winding	
10	Winding connection	
11	Kind of rotor winding	
12	Kind of bearings	
13	Direction of rotation when viewed from NDE	
14	Paint Shade & type	
15	Net weight of motor	
16	Outline mounting drawing No (To be enclosed as annexure)	
D.	Characteristic curves/ drawings (To be enclosed for motors of rating $\geq 55\text{KW}$)	
	a) Torque speed characteristic	
	b) Thermal withstand characteristic	
	c) Current vs time	
	d) Speed vs time	

NAME OF VENDOR			SEAL	REV.	
NAME	SIGNATURE	DATE			

	TITLE MOTOR DATA SHEET - C	SPECIFICATION NO.
		VOLUME II B
		SECTION D
		REV NO. 00 DATE 29/08/2005
		SHEET 1 OF 2

S. No.	Description		Data to be filled by successful bidder
A.	General		
1	Manufacturer & country of origin		
2	Motor type		
3	Type of starting		
4	Name of the equipment driven by motor & Quantity		
5	Maximum Power requirement of driven equipment		
6	Rated speed of Driven Equipment		
7	Design ambient temperature		
B.	Design and Performance Data		
1	Frame size & type designation		
2	Type of duty		
3	Rated Voltage		
4	Permissible variation for		
5	a	Voltage	
6	b	Frequency	
7	c)	Combined voltage & frequency	
8	Rated output at design ambient temp (by resistance method)		
9	Synchronous speed & Rated slip		
10	Minimum permissible starting voltage		
11	Starting time in sec with mechanism coupled		
12	a)	At rated voltage	
13	b)	At min starting voltage	
14	Locked rotor current as percentage of FLC (including IS tolerance)		
15	Torque		
	a)	Starting	
	b)	Maximum	
16	Permissible temp rise at rated output over ambient temp & method		
17	Noise level at 1.0 m (dB		
18	Amplitude of vibration		
19	Efficiency & P.F. at rated voltage & frequency		
	a)	At 100% load	
	c)	At 75% load	

NAME OF VENDOR			SEAL	REV.	
NAME	SIGNATURE	DATE			

ANNEXURE-II: DEVIATION SHEET (COST OF WITHDRAWAL)									
									
PROJECT:-									
PACKAGE:-									
TENDER ENQUIRY REFERENCE:-									
NAME OF VENDOR:-									
SL NO	VOULME/ SECTION	PAGE NO.	CLAUSE NO.	TECHNICAL SPECIFICATION/ TENDER DOCUMENT	COMPLETE DESCRIPTION OF DEVIATION	COST OF WITHDRAWAL OF DEVIATION	REFERENCE OF PRICE SCHEDULE ON WHICH COST OF WITHDRAWAL OF DEVIATION IS APPLICABLE	NATURE OF COST OF WITHDRAWAL OF DEVIATION (POSITIVE/ NEGATIVE)	REASON FOR QUOTING DEVIATION
TECHNICAL DEVIATIONS									
COMMERCIAL DEVIATIONS									
PARTICULARS OF BIDDERS/ AUTHORISED REPRESENTATIVE									
NAME				DESIGNATIONS			SIGN & DATE		
NOTES:									
1. For self manufactured items of bidder, cost of withdrawal of deviation will be applicable on the basic price (i.e. excluding taxes, duties & freight) only.									
2. For directly dispatchable items, cost of withdrawal of deviation will be applicable on the basic price including taxes, duties & freight.									
3. All the bidders have to list out all their Technical & Commercial Deviations (if any) in detail in the above format.									
4. Any deviation not mentioned above and shown separately or found hidden in offer, will not be taken cognizance of.									
5. Bidder shall submit duly filled unpriced copy of above format indicating "quoted" in "cost of withdrawal of deviation" column of the schedule above along with their Techno-commercial offer, wherever applicable.									
6. Bidder shall furnish price copy of above format along with price bid.									
7. The final decision of acceptance/ rejection of the deviations quoted by the bidder shall be at discretion of the Purchaser.									
8. Bidders to note that any deviation (technical/commercial) not listed in above and asked after Part-I opening shall not be considered.									
9. For deviations w.r.t. Payment terms, Liquidated damages, Firm prices and submission of E1/ E2 forms before claiming 10% payment, if a bidder chooses not to give any cost of withdrawal of deviation loading as per Annexure-VIII of GCC, Rev-06 will apply. For any other deviation mentioned in un-priced copy of this format submitted with Part-I bid but not mentioned in priced copy of this format submitted with Priced bid, the cost of withdrawal of deviation shall be taken as NIL.									
10. Any deviation mentioned in priced copy of this format, but not mentioned in the un-priced copy, shall not be accepted.									
11. All techno-commercial terms and conditions of NIT shall be deemed to have been accepted by the bidder, other than those listed in unpriced copy of this format.									
12. Cost of withdrawal is to be given separately for each deviation. In no event bidder should club cost of withdrawal of more than one deviation else cost of withdrawal of such deviations which have been clubbed together shall be considered as NIL.									
13. In case nature of cost of withdrawal (positive/negative) is not specified it shall be assumed as positive.									
14. In case of discrepancy in the nature of impact (positive/ negative), positive will be considered for evaluation and negative for ordering.									

BANK GUARANTEE FOR PERFORMANCE SECURITY

Bank Guarantee No:

Date:

To

NAME

& ADDRESSES OF THE BENEFICIARY

Dear Sirs,

In consideration of the Bharat Heavy Electricals Limited ¹ (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 _____ through its Unit at.....(name of the Unit) having awarded to (Name of the Vendor / Contractor / Supplier) having its registered office at _____ ² hereinafter referred to as the '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 Contractor having agreed to provide a Contract Performance Guarantee, equivalent to% (.... Percent) of the said value of the Contract to the Employer for the faithful performance of the Contract,

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 a maximum amount Rs ----- (Rupees -----) without any demur, immediately on a demand from the Employer, .

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. _____.

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

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

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 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.

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 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 Contractor/Supplier and to forbear or enforce any of the terms and conditions relating to the said Agreement and we shall not be relieved from our liability by reason of any such variation, or extension being granted to the said Contractor/Supplier or for any forbearance, act or omission on the part of the Employer or any indulgence by the Employer to the said 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.

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 Contractor and notwithstanding any security or other guarantee that the Employer may have in relation to the Contractor's liabilities.

This Guarantee shall remain in force upto and including.....⁶ and shall be extended from time to time for such period as may be desired by Employer.

This Guarantee shall not be determined or affected by liquidation or winding up, dissolution or change of constitution or insolvency of the 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.

Unless a demand or claim under this guarantee is made on us in writing on or before the⁷we shall be discharged from all liabilities under this guarantee thereafter.

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.....⁸
- b) This Guarantee shall be valid up to⁹
- c) Unless the Bank is served a written claim or demand on or before¹⁰ 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.

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.....

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 PROJECT/SUPPLY DETAILS

⁵ BG AMOUNT IN FIGURES AND WORDS

⁶ VALIDITY DATE

⁷ DATE OF EXPIRY OF CLAIM PERIOD

⁸ BG AMOUNT IN FIGURES AND WORDS.

⁹ VALIDITY DATE

¹⁰ DATE OF EXPIRY OF CLAIM PERIOD

Note:

1. Units are advised that expiry of claim period may be kept 2/3 months after validity date.
2. In Case of Bank Guarantees submitted by Foreign Vendors-
 - a. **From Nationalized/Public Sector / Private Sector/ Foreign Banks (BG issued by Branches in India)** can be accepted subject to the condition that the Bank Guarantee should be enforceable in the town/city or at nearest branch where the Unit is located i.e. Demand can be presented at the Branch located in the town/city or at nearest branch where the Unit is located.
 - b. **From Foreign Banks (wherein Foreign Vendors intend to provide BG from local branch of the Vendor country's Bank)**
 - b.1 In such cases, in the Tender Enquiry/ Contract itself, it may be clearly specified that Bank Guarantee issued by **any of the Consortium Banks only** will be accepted by BHEL. As such, Foreign Vendor needs to make necessary arrangements for issuance of Counter- Guarantee by Foreign Bank in favour of the Indian Bank (BHEL's Consortium Bank). It is advisable that all charges for issuance of Bank Guarantee/ counter- Guarantee should be borne by the Foreign Vendor. The tender stipulation should clearly specify these requirements.
 - b.2 **In case, Foreign Vendors intend to provide BG from Overseas Branch of our Consortium Bank** (e.g. if a BG is to be issued by SBI Frankfurt), the same is acceptable. However, the procedure at **sl.no. b.1** will required to be followed.
 - b.3 The BG issued may preferably be subject to Uniform Rules for Demand Guarantees (URDG) 758 (as amended from time to time). In case, of Foreign Vendors, the BG Format provided to them should clearly specify the same.
 - b.4 The BG should clearly specify that the demand or other document can be presented in electronic form.