

KARNATAKA POWER CORPORATION LIMITED

**1X370 MW YELAHANKA
COMBINED CYCLE POWER PLANT**

VOLUME: II B & III

**TECHNICAL SPECIFICATIONS
FOR
CHEMICAL DOSING SYSTEM**

SPECIFICATION NO.: PE-TS-409-154-A001,R01



**BHARAT HEAVY ELECTRICALS LIMITED
POWER SECTOR
PROJECT ENGINEERING MANAGEMENT
NOIDA, INDIA**



TITLE:
KARNATAKA POWER CORPORATION LIMITED
1x370 MW KPCL YELAHANKA CCPP
TECHNICAL SPECIFICATION FOR CHEMICAL DOSING SYSTEM
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SPEC NO: PE-TS-409-154-A001

VOLUME:

SECTION:

REV NO: 01

DATE:

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KARNATAKA POWER CORPORATION LIMITED
1x370 MW KPCL YELAHANKA CCPP
TECHNICAL SPECIFICATION FOR CHEMICAL DOSING SYSTEM

SPEC NO: PE-TS-409-154-A001

VOLUME: IIB

SECTION: A

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DATE:

SECTION – A INTENT OF SPECIFICATION



TITLE:
KARNATAKA POWER CORPORATION LIMITED
1x370 MW KPCL YELAHANKA CCPP
TECHNICAL SPECIFICATION FOR CHEMICAL DOSING SYSTEM

SPEC NO: PE-TS-409-154-A001

VOLUME: IIB

SECTION: A

REV NO: 01

DATE:

- 1.1 The specification covers design, engineering, manufacture, supply / procurement, inspection and testing at vendor's / sub vendor's / manufacturer's works, painting, forwarding, proper packing and shipment and delivery at site, as required on FOR site basis along with mandatory spares, start up and commissioning spares, special tools & tackles, of **CHEMICAL DOSING SYSTEM** as per details in different sections / volumes of this specification for **1X370 MW YELAHANKA CCPP**.
- 1.2 The contractor shall be responsible for providing all material, equipment & services, which are required to fulfil the intent of ensuring operability, maintainability, reliability and complete safety of the complete work covered under this specification, irrespective of whether it has been specifically listed herein or not. Omission of specific reference to any component / accessory necessary for proper performance of the equipment shall not relieve the contractor of the responsibility of providing such facilities to complete the supply, erection and commissioning of **CHEMICAL DOSING SYSTEM**.
- 1.3 It is not the intent to specify herein all the details of design and manufacture. However, the equipment shall conform in all respects to high standards of design, engineering and workmanship and shall be capable of performing the required duties in a manner acceptable to purchaser who will interpret the meaning of drawings and specifications and shall be entitled to reject any work or material which in his judgement is not in full accordance herewith.
- 1.4 The extent of supply under the contract includes all items shown in the drawings, notwithstanding the fact that such items may have been omitted from the specification or schedules. Similarly, the extent of supply also includes all items mentioned in the specification and /or schedules, notwithstanding the fact that such items may have been omitted in the drawing.
- 1.5 The general term and conditions, instructions to tenderers and other attachment referred to elsewhere are made part of the tender specification. The equipment materials and works covered by this specification is subject to compliance to all attachments referred to in the specification. The bidder shall be responsible for and governed by all requirements stipulated herein.
- 1.6 While all efforts have been made to make the specification requirement complete & unambiguous, it shall be bidders' responsibility to ask for missing information, ensure completeness of specification, to bring out any contradictory / conflicting requirement in different sections of the specification and within a section itself to the notice of BHEL and to seek any clarification on specification requirement in the format enclosed under Vol-III of the specification within 10 days of receipt of tender documents. In absence of any such clarifications, in case of any contradictory requirement, the more stringent requirement as per interpretation of Purchaser / Customer shall prevail and shall be complied by the bidder without any commercial implication on account of the same. Further in case of any missing information in the specification not brought out by the prospective bidders as part of pre-bid clarification, the same shall be furnished by Purchaser/ Customer as and when brought to their notice either by the bidder or by purchaser/ customer themselves. However, such requirements shall be binding on the successful bidder without any commercial & delivery implication.
- 1.7 The bidder's offer shall not carry any sections like clarification, interpretations and /or assumptions.
- 1.8 Deviations, if any, should be very clearly brought out clause by clause along with cost of withdrawal in the enclosed schedule (in Vol – III); otherwise, it will be presumed that the vendor's offer is strictly in line with NIT specification. If no cost of withdrawal is given against the deviation, it will be presumed that deviation can be withdrawn without any cost to BHEL/its customer.
- 1.9 In the event of any conflict between the requirements of two clauses of this specification documents or requirements of different codes and standards specified, Section - C shall prevail over section – D, however more stringent requirement as per the interpretation of the owner shall apply.
- 1.10 In case all above requirements are not complied with, the offer may be considered as incomplete and would become liable for rejection.
- 1.11 For definition of word like Contractor, bidder, supplier, vendor, Customer/ Purchaser / Employer, consultant, please referred relevant clause(s) of GCC.



TITLE:
KARNATAKA POWER CORPORATION LIMITED
1x370 MW KPCL YELAHANKA CCPP
TECHNICAL SPECIFICATION FOR CHEMICAL DOSING SYSTEM

SPEC NO: PE-TS-409-154-A001
VOLUME: IIB
SECTION: B
REV NO: 01 DATE:

SECTION – B PROJECT INFORMATION

KPCL/Yelahanka 	KARNATAKA POWER CORPORATION LIMITED 370 MW Yelahanka CCPP TITLE PROJECT INFORMATION	SECTION: B VOLUME-II SHEET 1 OF 1
1.0 Owner 2.0 Project Title 3.0 Location 4.0 Latitude and Longitude 5.0 Elevation above mean sea level 6.0 <u>Climatic Conditions</u> (a) <u>Temperature</u> i. <u>Monthly basis</u> Mean of daily maximum temperature Mean of daily minimum temperature ii Highest temperature recorded iii Lowest temperature recorded (b) Relative Humidity (c) <u>Rainfall</u> Annual average rain (d) <u>Wind Speed</u> i. Annual mean wind speed ii. Maximum mean wind speed iii Design Wind Speed 7.0 Seismic data Zone	: Karnataka Power Corporation Ltd Shakthi Bhavan No.82, Race Course Road Bangalore-560 001 Karnataka, India 370 MW Yelahanka CCPP : Yelahanka Bangalore Dist Karnataka state INDIA : 13° 07' N Latitude 77° 35' E Longitude : 900 meters : 37° C : 11.5° C : 39°C : 7.8°C : Varies between 60% and 90% : 970 mm : 2.82 m/s : 3.71 m/s in the month of June. : 33M/sec (As per IS: 875) : Seismic Zone II As per IS 1893	

STATION : BANGALORE CITY

2003												2004					
Month	Temperature in deg.Celsius				Mean RH %		Temperature in deg.Celsius				Mean RH %						
	Mean Max	Highest Max.	Mean Min.	Lowest Min.	0830 hrs.	1730 hrs.	Mean Max	Highest Max	Mean Min.	Lowest Min.	0830 hrs.	1730 hrs.					
Jan	28.6	31.6	16.0	13.9	80	43	28.8	31.1	16.2	13.7	81	42					
Feb	31.7	33.2	18.9	16.9	75	35	31.1	34.1	16.9	15.1	64	31					
Mar	33.6	35.4	20.4	17.2	67	33	34.3	36.2	20.0	15.7	58	22					
Apr	34.2	36.0	22.3	19.9	74	41	34.2	37.0	22.4	18.7	72	39					
May	35.2	37.6	22.8	21.0	71	34	29.9	34.6	20.8	18.7	84	71					
Jun	31.6	38.1	21.1	19.5	84	62	29.0	31.2	20.0	19.2	86	65					
Jul	29.3	31.3	20.5	19.5	87	68	28.3	31.8	19.8	17.7	89	71					
Aug	28.6	31.6	20.3	19.0	88	68	28.1	30.7	19.7	18.9	86	69					
Sep	29.1	31.8	19.8	18.7	81	58	28.0	31.1	19.9	18.6	88	72					
Oct	28.7	30.6	19.9	17.3	85	72	28.0	31.4	19.4	17.7	86	71					
Nov	27.8	29.4	18.0	15.0	80	60	26.8	29.0	17.6	14.8	79	62					
Dec	27.8	31.1	16.0	13.0	76	48	28.1	29.9	15.4	13.0	76	46					

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 DIRECTOR
 Meteorological Centre
 Central Observatory Complex
 Palace Road,
 BANGALORE 560 001.

STATION : BANGALORE CITY

Month	2005						2006					
	Temperature in deg.Celsius						Temperature in deg.Celsius					
	Mean Max	Highest Max	Mean Min.	Lowest Min.	0830 hrs.	1730 hrs.	Mean Max	Highest Max	Mean Min.	Lowest Min.	0830 hrs.	1730 hrs.
Jan	29.3	31.8	16.8	13.9	79	42	28.5	32.5	16.0	13.4	72	42
Feb	31.6	35.9	17.9	14.3	64	29	30.6	34.1	15.5	12.3	59	25
Mar	33.6	36.4	20.5	17.2	68	27	32.0	34.4	19.9	17.9	69	37
Apr	32.7	35.4	21.7	19.9	72	47	33.8	36.3	22.3	19.6	72	37
May	33.9	37.4	21.7	18.5	78	47	32.4	37.0	21.4	19.4	76	55
Jun	30.3	33.8	20.8	19.3	84	60	29.6	32.2	20.4	19.0	83	66
Jul	28.5	30.4	20.2	18.3	89	70	28.5	30.9	20.1	18.5	84	63
Aug	28.1	30.5	19.9	18.6	87	68	29.0	31.6	20.1	19.3	83	62
Sep	28.2	31.5	19.9	18.8	87	66	29.9	32.4	20.5	19.5	91	61
Oct	27.4	30.5	19.7	16.6	91	78	29.5	31.4	20.0	18.8	81	63
Nov	26.2	29.9	17.3	13.5	82	67	27.7	30.6	19.0	16.6	83	68
Dec	26.8	29.4	16.6	13.6	80	61	27.1	28.2	15.8	14.2	83	56

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DIRECTOR

Meteorological Centre
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Palace Road,
BANGALORE

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STATION : BANGALORE CITY

Month	2007						2008					
	Temperature in deg.Celsius				Mean RH %		Temperature in deg.Celsius				Mean RH %	
	Mean Max	Highest Max.	Mean Min.	Lowest Min.	0830 hrs.	1730 hrs.	Mean Max	Highest Max.	Mean Min.	Lowest Min.	0830 hrs.	1730 hrs.
Jan	28.9	32.1	15.8	14.2	79	40	29.2	31.2	16.1	13.6	77	38
Feb	30.9	33.8	17.3	13.7	73	38	29.9	33.1	18.6	16.0	75	41
Mar	33.9	35.9	20.8	18.6	65	25	30.3	32.6	19.1	14.4	69	44
Apr	34.1	36.4	21.7	18.2	71	34	33.0	36.9	21.5	18.9	71	37
May	33.4	35.8	22.0	20.0	76	52	34.1	36.0	21.6	20.3	76	46
Jun	29.9	34.4	20.9	19.7	81	61	29.5	32.0	20.4	18.7	83	59
Jul	28.8	30.2	20.4	18.8	86	68	28.7	32.4	20.1	18.6	87	67
Aug	27.9	31.7	20.1	19.1	88	71	27.7	29.9	20.2	19.2	89	72
Sep	28.0	31.3	20.0	18.8	88	69	28.5	31.6	19.8	18.4	85	60
Oct	28.5	32.3	19.7	16.7	82	64	28.1	31.4	19.4	14.7	85	70
Nov	27.9	30.1	17.4	12.7	71	56	27.6	30.0	17.9	15.0	78	58
Dec	26.3	29.6	16.5	11.8	81	57	27.3	28.7	16.4	13.9	80	49

29.87 36.4 19.38 11.8 29.19 36.7 19.25 13.6
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 BANGALORE 560 001

STATION : BANGALORE CITY

2009													2010					
Month	Temperature in deg.Celsius				Mean RH %		Temperature in deg.Celsius						Mean RH %					
	Mean Max	Highest Max.	Mean Min.	Lowest Min.	0830 hrs.	1730 hrs.	Mean Max	Highest Max.	Mean Min.	Lowest Min.	0830 hrs.	1730 hrs.						
Jan	28.1	31.9	15.3	12.1	78	38	28.1	29.5	17.1	14.1	82	41						
Feb	31.8	35.2	17.7	15.3	63	26	31.8	34.4	18.2	14.3	72	29						
Mar	33.1	35.5	20.4	17.3	66	28	34.5	35.7	21.3	18.5	68	27						
Apr	34.5	37.0	22.2	20.0	70	30	34.5	37.6	22.7	20.3	71	43						
May	32.8	36.9	21.6	19.2	79	53	33.0	36.2	22.3	19.3	78	52						
Jun	29.7	31.8	20.4	18.4	84	61	29.9	34.0	21.2	19.5	86	66						
Jul	27.9	30.0	20.1	19.4	86	66	27.5	30.2	20.3	19.1	89	72						
Aug	28.6	31.1	20.3	19.3	87	65	27.4	29.8	20.5	18.8	88	69						
Sep	28.1	31.3	20.2	18.2	88	73	27.8	31.8	20.2	18.7	89	67						
Oct	28.8	31.0	19.4	17.9	77	53	28.5	30.4	20.4	18.4	87	69						
Nov	27.4	29.9	19.3	15.5	84	67	26.4	29.2	19.3	17.5	88	74						
Dec	27.0	29.3	17.7	15.0	84	62	26.4	29.9	16.9	12.9	85	56						

29.82 34 19.55 18.1
 29.65 34 20.03 18.8

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 Meteorological Centre
 Central Observatory Complex
 Bangalore

STATION : BANGALORE CITY

Month	2011						2012					
	Temperature in deg. Celsius				Mean RH %		Temperature in deg. Celsius				Mean RH %	
	Mean Max	Highest Max	Mean Min.	Lowest Min.	0830hrs.	1730hrs.	Mean Max	Highest Max	Mean Min.	Lowest Min.	0830hrs.	1730hrs.
Jan	28.9	31.3	15.7	12.6	71	34	28.9	30.6	16.2	12.0	78	38
Feb	30.1	32.2	16.9	14.0	64	29	31.4	35.4	17.2	14.0	69	25
Mar	33.1	34.8	19.4	15.2	61	22	34.4	35.6	20.6	17.7	66	23
Apr	33.1	34.6	21.6	19.1	78	44	34.9	37.5	22.6	20.7	72	34
May	32.4	34.8	21.3	19.3	80	55	33.0	35.2	22.1	19.5	79	47
Jun	29.0	30.9	20.4	19.2	88	69	30.9	34.1	21.0	20.0	77	51
Jul	28.1	30.4	20.1	18.9	88	68	28.8	32.2	20.4	19.2	84	59
Aug	27.5	30.2	20.1	19.2	89	73	28.5	32.4	20.2	19.5	86	66
Sep	28.3	30.8	20.1	18.2	86	62	29.2	32.5	20.3	19.2	82	56
Oct	29.3	31.0	20.3	18.2	87	71	28.5	32.3	19.6	18.0	81	61
Nov	27.3	29.5	17.9	15.0	78	61	28.1	30.8	17.6	13.3	75	52
Dec	27.4	29.8	16.3	12.8	77	47	28.0	30.7	16.9	14.4	81	48

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DIRECTOR
Meteorological Centre
Bangalore 560 001
KARNATAKA



TITLE:
KARNATAKA POWER CORPORATION LIMITED
1x370 MW KPCL YELAHANKA CCPP
TECHNICAL SPECIFICATION FOR CHEMICAL DOSING SYSTEM

SPEC NO: PE-TS-409-154-A001

VOLUME: IIB

SECTION: C

REV NO: 01

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SECTION – C SPECIFIC TECHNICAL REQUIREMENT



TITLE:
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TECHNICAL SPECIFICATION FOR CHEMICAL DOSING SYSTEM

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VOLUME: IIB

SECTION: C1

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DATE:

SECTION – C1 SPECIFIC TECHNICAL REQUIREMENT -MECHANICAL

- **SECTION-C1-A- SCOPE OF SUPPLY & SERVICES, EXCLUSION AND TERMINAL POINTS ETC.**
- **SECTION-C1-B- VOID**
- **SECTION-C1-C- VOID**
- **SECTION-C1-D- QUALITY ASSURANCE**
- **SECTION-C1-E- PAINTING SPECIFICATION**
- **SECTION-C1-F- DATASHEET-A**



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1x370 MW KPCL YELAHANKA CCPP
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SPEC NO: PE-TS-409-154-A001

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SECTION: C1-A

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DATE:

**SECTION – C1-A
SCOPE OF SUPPLY & SERVICES, EXCLUSION
AND TERMINAL POINTS ETC.**



TITLE:
KARNATAKA POWER CORPORATION LIMITED
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VOLUME: IIB

SECTION: C1-A

REV NO: 01

DATE:

1.0 SCOPE:

Complete Boiler Feed water chemical dosing (AVT) system complete with dosing pumps, tanks, associated piping's, supports, fittings, valves, instrumentation and controls etc.

2.0 DESIGN PHILOSOPHY:

Chemical dosing systems are designed to dose required quantity of chemicals to maintain the quality of boiler feed water. Chemicals are dosed both in low pressure side of feed water cycle as well as in DMCW system & high pressure side of feed water cycle in Boiler drum..

3.0 SCOPE OF SUPPLY FOR BIDDER FOR CHEMICAL DOSING SYSTEM:

Broad scope of work for bidder for this package includes all equipment and accessories. Please also refer Electrical and C&I sections (section C2 & section C3) for respective scopes

The Chemical dosing system covers the Low Pressure Chemical dosing system, consists of Hydrazine dosing system, Ammonia dosing system for boiler feed water & NaOH dosing skids for DMCW system and High Pressure Chemical dosing system consist of Phosphate dosing system . The details of each dosing system are given below:

3.1 LOW PRESSURE CHEMICAL DOSING SYSTEM:

3.1.1 HYDRAZINE DOSING SYSTEM: (NO. OF SKID= 1 NO.)

(Refer drg no. PE-DG-409-154-A001. Rev. 01)

One number of Hydrazine Dosing Skid consists of the following:

- One (1) No. Hydrazine solution preparation cum metering tank.
- Two (2X100%) Hydrazine Dosing Pumps.
- One (1) no Hand operated Barrel Pump.
- Associated Piping, valves, fitting as indicated in the P&ID of Hydrazine dosing system and Datasheet-A enclosed and as required to make the system complete.
- Foundation nuts & bolts to fix each skid on the floor, as required.
- Control & instrumentation as per P&ID of Hydrazine dosing system, Data sheet-A, Section C2 & C3.

3.1.2 AMMONIA DOSING SYSTEM: (NO. OF SKID= 1 NO.)

(Refer drg no. PE-DG-409-154-A002. Rev. 01)

One number of Ammonia Dosing Skid consists of the following:

- One (1) No. Ammonia solution preparation cum metering tank.
- Two (2X100%), Ammonia Dosing Pumps.
- One (1) no Hand operated Barrel Pump.
- Associated Piping, valves, fitting as indicated in the P&ID of ammonia dosing system and data sheet-A enclosed and as required to make the system complete.
- Foundation nuts & bolts to fix each skid on the floor, as required.
- Control & instrumentation as per P&ID of ammonia dosing system, Data sheet-A, Section C2 & C3.

3.1.3 NAOH DOSING SYSTEM FOR DMCW SYSTEM: (NO. OF SKID= 1 NO.)

(Refer drg. No. PE-DG-409-154-A003, Rev. 01)

One number of NaOH Dosing skid consists of the following:

- One number NaOH solution preparation cum metering tank.
- Associated Piping, valves, fitting as indicated in the P&ID of NaOH dosing system and data sheet-A enclosed and as required to make the system complete.
- Foundation nuts & bolts to fix each skid on the floor, as required
- Control & instrumentation as per P&ID of NaOH dosing system, Data sheet-A, Section C2 & C3.



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VOLUME: IIB

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DATE:

3.2 HIGH PRESSURE CHEMICAL DOSING SYSTEM:

3.2.1 PHOSPHATE DOSING SYSTEM FOR BOILER DRUM: (NO. OF SKID= 1 NO.)

(Refer drg. No. PE-DG-409-154-A004, Rev. 01)

One number of Phosphate Dosing Skid consists of the following:

- One (1) No, Phosphate solution Metering tank.
- One (1) No, Phosphate solution Preparation tank.
- Two (2) nos (2 x 100%). Phosphate dosing pumps for HP drum.
- Two (2) nos (2 x 100%). Phosphate dosing pumps for IP drum.
- Two (2) nos (2 x 100%). Phosphate dosing pumps for LP drum.
- Associated Piping, valves, fitting as indicated in the P&ID of phosphate dosing system and data sheet-A enclosed and as required to make the system complete.
- Foundation nuts & bolts to fix each skid on the floor, as required.
- Control & instrumentation as per P&ID of phosphate dosing system, Data sheet-A, Section C2 & C3.

4.0 SCOPE OF SERVICE

The bidder's scope also includes following services for scope under this specification:

- Design and engineering.
- Fabrication of the skid mounted chemical dosing system.
- Inspection and testing of the skid as per the approved quality assurance plan.
- Supply of the skid mounted chemical dosing system up to the power plant site along with all accessories as defined in the technical specification.
- Painting shall be as specified in "Painting Specification (Section-C1-E)" of this technical specification. Bidder to note that paint shed shall be finalized during detailed engineering as per Customer (KPCL) & BHEL requirement and any variation in the painting schedule as finally approved by Customer (KPCL) shall be taken care by bidder without any commercial and delivery implication.

5.0 CIVIL SCOPE

Nil.

6.0 MANDATORY SPARES

Mandatory spares. .(Refer attached, Annexure-II).

7.0 ERECTION & COMMISSIONING SPARES

Scope of Erection & Commissioning Spares shall be as per Erection & Commissioning spare list as enclosed as Annexure-III in this technical specification. Any additional spares required shall also be in the scope of bidder.

8.0 TERMINAL POINTS (ALSO REFER P & I DIAGRAM ENCLOSED)

- All piping beyond battery limit of skid as indicated in P&ID's enclosed with the technical specification is excluded from bidder's scope.
- Electrical scope shall be as per Electrical scope matrix attached in Section C3 of the technical specification.
- All drains shall be brought at one point on the skid by the bidder via a drain header and further connection to the nearest plant drain shall be done by BHEL/Customer (KPCL) .
- Counter flanges for all the piping terminal points (as per P&ID) and for the terminal point of drain header shall be in bidder's scope.

9.0 PAINTING:

Bidder to note that painting shall be as per approved painting requirement to be finalized during detailed engineering. However the same shall be prepared in line with the Painting Specification enclosed in Section-C1-E of technical specification.



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10.0 PACKING:

To prevent damage to the equipment of the skid during transit, wooden / angle iron / steel frame supports to be provided wherever required. Special attention shall be provided while packing and loading for overhead equipment. Necessary packing procedure/drawing shall be submitted by successful bidder during detailed engineering for BHEL/Customer (KPCL) approval.

11.0 QUALITY PLAN AND SUB VENDOR APPROVAL

1.0 The quality assurance plan is enclosed as "Quality assurance (Section-C1-D). However requirement of detailed QP, inspection checklist, certificate of conformance etc. for each equipment and sub-vendor shall be finalized during detailed engineering stage; decision of BHEL/Customer (KPCL) shall be binding on vendor in this regard. Any changes/additional tests insisted upon by Owner during approval of QAP's shall be accepted by bidder without any commercial and delivery implication to BHEL/Customer (KPCL). Bidder shall submit the quality plans in BHEL format during detailed engineering stage. Bidder to note further that during detailed engineering all the QAP's/check lists etc. shall be submitted to Customer (KPCL) /BHEL for approval. All inspection & testing etc. shall be carried out accordingly.

2.0 The List of makes of sub vendor items enclosed as **ANNEXURE-I** is indicative only and is subject to approval / acceptance by Customer (KPCL). Bidder to propose his sub vendor list with back up documents (experience list, end user certificate as applicable) etc. The same shall subject to BHEL and Customer (KPCL) approval during detailed engineering stage without any technical, commercial & delivery implication to BHEL.

12.0 DESIGN REQUIREMENTS

Bidder to note that design requirement of the chemical dosing skids shall be as below: -

- a. In addition to the requirements of Section- C1 , C2, & C3,the following shall also be complied under scope of this specification: The P&ID is enclosed herein in this section for bidder's compliance.
- b. The material of construction specified in Data Sheet-A are minimum requirements and material of construction for other components not specified shall be similarly selected by the bidder for intended duty which shall be subjects to Customer (KPCL) approval during detailed engineering.
- c. All instrument-wetted parts will be suitable for requested application.
- d. All high points on any, tanks, pumps, piping or instrumentation will be vented and provided with valve. All low points on any, tanks, pumps, piping or instruments will be drained and provided with valve.
- e. All valves and instruments will be located such that they are easily accessible during normal operation and maintenance.
- f. 5mm thick IS 2062 Checker plate shall be provided covering the skid frame and for elevated platform for the preparation/measuring tank, wherever applicable. The tanks supports, pumps and pipe supports and LCP/LCP supports shall be welded to the checker plate.
- g. Stuffing box shall be provided for mounting the agitator to avoid air ingress.
- h. Vent/overflow pipe from tank shall at least reach the bottom half of the breather/water seal/CO2 absorber.
- i. SS pad shall be provided for welding MS structural supports to SS tanks.
- j. Step ladder and chemical charging platform shall be provided for easy access to top of tank.
- k. All the terminal points shall be easily accessible and towards one side of skid.
- l. All valves shall be easily accessible for the operator.
- m. All tanks/pumps shall have name plate clearly indicating the equipment name.
- n. Pipe fittings of the system shall be done using elbows and tees. Pipe bending is not acceptable.
- o. All equipment shall have SS name plate.



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- p. All LCP shall be mounted in their respective dosing skids only.
- q. All the terminal points where flange joints are involved, bidder shall terminate it along with matching counter flange, nuts, bolts, gaskets etc.
- r. KKS codes for all drives and instruments for the project have to be followed.
- s. KKS numbering shall be followed for all instruments/equipments/tanks/valves/pipe etc for maintaining plant quality standard.
- t. Low Low/Low/Adequate/High values of level shall be provided in drawings.

13.0 CONTROL PHILOSOPHY

13.1 LOW PRESSURE CHEMICAL DOSING SYSTEM:

- a) This control write-up is applicable for the following LP dosing systems:

- i) Hydrazine dosing system.
- ii) Ammonia dosing system.

The control of all dosing systems shall be realized in Plant DCS including ON/OFF command of the individual pumps and stirrers. All controls, fault indicators/alarms, interlocks, logics shall be implemented in Plant DCS. Separate local panel shall be provided for each of the above said system.

The starter of all the motors shall be provided on local control panel. Power to all pumps, agitators etc. shall be fed from LCP. DCS commands shall extend to LCP.

A local panel comprising of 'START' push button, 'STOP' push button along with 'ON/OFF/TRIP' indication, local/remote indication, stroke position indicator, raise/ lower push button for stroke position and local annunciation shall be provided for local operation. The 'STOP' push button shall be wired directly to MCC whereas 'START' push button shall be routed to DDCMIS.

The ON/OFF operation of all motorized stirrers and pumps shall also be provided in Plant DCS with local ON, OFF facility.

The auto stroke controllers of each pump shall be provided in the local panel. The stroke position & adjustment will be done from Plant DCS & Local panel and the stroke controller shall be suitable for accepting 4-20 mA DC signals. The pumps shall be provided with 24 V DC, 2- wire LVDT Type Position feedback transmitter to generate 4-20 mA DC signals to indicate stroke position in Plant DCS & Local panel.

The Local/ Remote selection switch (soft) shall be provided in Plant DCS and its indication shall be provided in LCP. LCP shall be located on the dosing skid.

- 1. Following interlocks shall be provided at low-low Level in the preparation cum metering tanks:

- i) Running Dosing pump shall be tripped.
- ii) Stirrer motor of the respective tank shall be tripped.

- 2. Following conditions to be ensured before starting a stirrer:

- i) Level in the tank adequate.
- ii) Motor not overload.
- iii) MCC not disturbed.

- 3. Following conditions to be ensured before starting a pump:

- i) Level in the tank adequate.
- ii) Motor not overload.
- iii) MCC not disturbed.
- iv) Differential pressure across filter- NOT HIGH (i.e Duplex strainer not choked).



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4. Following shall be provided on LCP:

- i) ON/ OFF/ Fault- Lamp Indications for all drives (pumps & agitator)
- ii) Operation 'Local selected' / operation 'Remote selected'- Lamp Indication, common for all drives.
- iii) Pump- Start/ Stop, Agitator-Start/ Stop –Push Buttons.
- iv) Auto stoke controller
- v) Stoke position indicator (may be a part of controller)
- vi) Local LED based annunciation driven by Plant DCS.

5. Following fault indications with alarm annunciations shall be provided on LCP & in Plant DCS:

- i) Low level in the preparation cum metering tanks.
- ii) Low-low level in the preparation cum metering tanks
- iii) High level in the preparation cum metering tanks.
- iv) Dosing pump tripped.
- v) Stirrer motor tripped.
- vi) Running dosing motor & stirrer motor tripped due to low-low level in preparation cum metering tanks.
- vii) Differential pressure across filter- HIGH
- viii) Running Pump discharge pressure - HIGH/ LOW.

SIGNAL EXCHANGE

1. Following signals shall be wired from **Plant DCS to LCP**. These shall be 24V DC powered signals. (PF contacts are not used to avoid the higher voltage LCP power supply reaching DDCMIS while contact interrogation).

- i) Operation local selected
- ii) Operation remote selected
- iii) Dosing Pump & stirrer (ON/OFF/FAULT)
- iv) Process conditions (as per clause 5 above)
- v) Dosing Pumps stroke length demand signal (4-20 mA).

2. Following signals shall be wired from **LCP to Plant DCS**. Binary signals shall be P.F. contacts.

- i) All field signals
- ii) START commands for all drives (pumps & agitator)
- iii) Dosing Pumps stroke length feedback signal (4-20 mA).

All the field instruments & stroke actuator shall be terminated at local panel by the vendor, for taking further to Plant DCS.

Instrument cabling from instruments to LCP and pre-wiring within LCP shall be done by our chemical dosing vendor. Cabling between LCP & Plant DCS shall be in BHEL's scope.

b) This control write-up is applicable for the following LP dosing systems:

- i) NaOH dosing system.

The control of all dosing systems shall be realized in Plant DCS including ON/OFF command of the stirrer. All controls, fault indicators/alarms, interlocks, logics shall be implemented in Plant DCS. Separate local panel shall be provided for each of the above said system.

The starter of all the motors shall be provided on local control panel. Power to agitators etc. shall be fed from LCP. DCS commands shall extend to LCP.



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A local panel comprising of 'START' push button, 'STOP' push button along with 'ON/OFF/TRIP' indication, local/ remote indication and local annunciation shall be provided for local operation. The 'STOP' push button shall be wired directly to MCC whereas 'START' push button shall be routed to DDCMIS.

The ON/OFF operation of motorized stirrer shall also be provided in Plant DCS with local ON, OFF facility.

The Local/ Remote selection switch (soft) shall be provided in Plant DCS and its indication shall be provided in LCP. LCP shall be located on the dosing skid.

1. Following interlocks shall be provided at low-low Level in the preparation cum metering tanks:
 - i) Stirrer motor of the respective tank shall be tripped.
2. Following conditions to be ensured before starting a stirrer:
 - ii) Level in the tank adequate.
 - iii) Motor not overload.
 - iv) MCC not disturbed.
3. Following shall be provided on LCP:
 - i) ON/ OFF/ Fault- Lamp Indications for all drives (i.e agitator)
 - ii) Operation 'Local selected' / operation 'Remote selected'- Lamp Indication, common for all drives.
 - iii) Agitator-Start/ Stop-Push Buttons.
 - iv) Local LED based annunciation driven by Plant DCS.
4. Following fault indications with alarm annunciations shall be provided on LCP & in Plant DCS:
 - i) Low level in the preparation cum metering tanks.
 - ii) Low-low level in the preparation cum metering tanks
 - iii) High level in the preparation cum metering tanks.
 - iv) Stirrer motor tripped.
 - v) Running stirrer motor tripped due to low-low level in preparation cum metering tanks.

SIGNAL EXCHANGE

1. Following signals shall be wired from **Plant DCS to LCP**. These shall be 24V DC powered signals. (PF contacts are not used to avoid the higher voltage LCP power supply reaching DDCMIS while contact interrogation).
 - i) Operation local selected
 - ii) Operation remote selected
 - iii) Stirrer (ON/OFF/FAULT)
 - iv) Process conditions (as per clause 4 above)
2. Following signals shall be wired from **LCP to Plant DCS**. Binary signals shall be P.F. contacts.
 - i) All field signals
 - ii) START commands for all drives (Agitator)

All the field instruments & stroke actuator shall be terminated at local panel by the vendor, for taking further to Plant DCS.

Instrument cabling from instruments to LCP and pre-wiring within LCP shall be done by our chemical dosing vendor. Cabling between LCP & Plant DCS shall be in BHEL's scope.

13.2 HIGH PRESSURE CHEMICAL DOSING SYSTEM:

The control of all dosing systems shall be realized in Plant DCS including ON/OFF command of the individual pumps and stirrers. All controls, fault indicators/alarms, interlocks, logics shall be implemented in Plant DCS. Separate local panel shall be provided for above said system.



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The starter of all the motors shall be provided on local control panel. Power to all pumps, agitators etc. shall be fed from LCP. DCS commands shall extend to LCP.

A local panel comprising of 'START' push button, 'STOP' push button along with 'ON/OFF/TRIP' indication, local/ remote indication, stroke position indicator, raise/ lower push button for stroke position and local annunciation shall be provided for local operation. The 'STOP' push button shall be wired directly to MCC whereas 'START' push button shall be routed to DDCMIS.

The ON/OFF operation of all motorized stirrers and pumps shall also be provided in Plant DCS with local ON, OFF facility.

The auto stroke controllers of each pump shall be provided in the local panel. The stroke position & adjustment will be done from Plant DCS & Local panel and the stroke controller shall be suitable for accepting 4-20 mA DC signals. The pumps shall be provided with 24 V DC, 2- wire LVDT Type Position feedback transmitter to generate 4-20 mA DC signals to indicate stroke position in Plant DCS & Local panel.

The Local/ Remote selection switch (soft) shall be provided in Plant DCS and its indication shall be provided in LCP. LCP shall be located on the dosing skid.

1. Following interlocks shall be provided at low-low Level in the preparation tanks:

- i) Running Dosing pumps shall be tripped.
- ii) Stirrer motor of the respective tank shall be tripped.

2. Following conditions to be ensured before starting a stirrer:

- i) Level in the tanks adequate.
- ii) Motor not overload.
- iii) MCC not disturbed.

3. Following conditions to be ensured before starting a pump:

- i. Level in the preparation tank adequate.
- ii. Motor not overload.
- iii. MCC not disturbed.
- iv. Differential pressure across filter- NOT HIGH (i.e Duplex strainer not choked).

4. Following shall be provided on LCP:

- i) ON/ OFF/ Fault- Lamp Indications for all drives (pumps & agitator)
- ii) Operation 'Local selected' / operation 'Remote selected'- Lamp Indication, common for all drives.
- iii) Pump- Start/ Stop, Agitator-Start/ Stop – Push Buttons.
- iv) Auto stroke controller
- v) Stoke position indicator (may be a part of controller)
- vi) Local LED based annunciation driven by Plant DCS.

5. Following fault indications with alarm annunciations shall be provided on LCP & in Plant DCS:

- i) Low level in the metering tanks.
- ii) Low-low level in the metering tanks
- iii) High level in the metering tanks.
- iv) Low level in the preparation tanks.
- v) Low-low level in the preparation tanks
- vi) High level in the preparation tanks.
- vii) Dosing pumps tripped.
- viii) Stirrer motors tripped.
- ix) Running dosing motors & stirrer motor tripped due to low-low level in preparation tanks.
- x) Differential pressure across filter- HIGH
- xi) Running Pump discharge pressure - HIGH/ LOW.



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SIGNAL EXCHANGE

1. Following signals shall be wired from **Plant DCS to LCP**. These shall be 24V DC powered signals. (PF contacts are not used to avoid the higher voltage LCP power supply reaching DDCMIS while contact interrogation).
 - i) Operation local selected
 - ii) Operation remote selected
 - iii) Dosing Pumps & stirrers (ON/OFF/FAULT)
 - iv) Process conditions (as per clause 5 above)
 - v) Dosing Pumps stroke length demand signal (4-20 mA).
2. Following signals shall be wired from **LCP to Plant DCS**. Binary signals shall be P.F. contacts.
 - i) All field signals
 - ii) START commands for all drives (pumps & agitator)
 - iii) Dosing Pumps stroke length feedback signal (4-20 mA).

All the field instruments & stroke actuator shall be terminated at local panel by the vendor, for taking further to Plant DCS.

Instrument cabling from instruments to LCP and pre-wiring within LCP shall be done by our chemical dosing vendor. Cabling between LCP & Plant DCS shall be in BHEL's scope.

14.0 DRAWING/DOCUMENTS REQUIREMENT (Pl refer electrical & C&I portion also):-

For the Drawings/Documents requirement, please refer **Annexure-VI**.

For the Drawings/Documents Distribution & Submission Procedure, please refer **Annexure-V**. The bidder has to submit the revised drawing/document along with the compliance sheet indicating enumerate reply to all BHEL and Customer (KPCL) comments or observations. Without compliance sheet the submission of the drawings/documents will not be considered and the delay on this account will be solely on bidder's side only. Bidder to comply with the observations of the BHEL and CUSTOMER (KPCL) without price & delivery implication.

15.0 SPARES

- 1.0 All the spares for the equipment under the contract provided by the vendor will strictly conform to the specifications and documents and will be identical to the corresponding main equipment/components supplied under the contract.
- 2.0 The quality plan and the inspection requirement finalized for the main equipment will also be applicable to the corresponding spares.
- 3.0 The list of mandatory spares considered essential by the BHEL & Customer (KPCL) is indicated in Annexure II. The bidder shall indicate the prices in the 'Schedule of mandatory Spares' whether or not he considers it necessary for the BHEL & Customer (GSECL) to have such spares. If the bidder fails to comply with the above or fails to quote the price of any spare item, the cost of such spares shall be deemed to be included in the contract price. The bidder shall furnish the population per unit of each item. Whenever the quantity is mentioned in "sets" the bidder has to give the item details and prices of each item.

The prices of mandatory spares indicated by the Bidder in the Bid Proposal sheets shall be used for bid evaluation purposes.

All mandatory spares shall be delivered at site at least two months before scheduled date of initial operation of the first unit. However, spares shall not be dispatched before dispatch of corresponding main equipments.

Wherever quantity is specified both as a percentage and a value, the Bidder has to supply the higher quantity until and unless specified otherwise.

- 4.0 Start-up and commissioning spares are in bidder's scope of supply.



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Start-up and Commissioning spares are those which would be required during equipment or system testing, start-up and commissioning. All spares used until the plant is finally handed over by the bidder to the Customer (KPCL) come under this category. All start-up and commissioning spares as required shall be provided by the bidder without any additional cost to the BHEL and Customer (KPCL). The list of minimum start-up and commissioning spares are attached as Annexure-III. However bidder to provide additional spares as per their system requirement without any commercial and delivery implication to BHEL/Customer (KPCL) during detailed engineering List of spares shall be furnished by BIDDER along with the offer.

Bidder shall be responsible for the ready and timely availability for all the startup and commissioning spares as required during various stages of testing, cleaning and commissioning up to handing over of each unit of the total plant.

An adequate stock of start-up spares shall be available at the site such that the start-up and commissioning of the equipment/systems, Performance guarantee test and handing over the equipment/ systems to the Customer (GSECL) will be carried out without hindrance and delay. All start-up spares which remain unused after the taking over of the plant shall remain the property of the Customer (KPCL).

The vendor warrants:

- i. That all spares supplied will be new and in accordance with the contract document and will be free from defects in design, material and workmanship and shall further guarantee as under:
- ii. In case of any failure in the original component/equipments due to faulty designs, materials and workmanship, the corresponding spare parts if any, supplied will be replaced without any extra cost to the BHEL and Customer (GSECL) unless a joint examination and analysis by BHEL and/or Customer (KPCL) of such spare parts prove that the defect found in the original part that failed can safely be assured not to be present in spare parts.
- iii. The long term availability of spares to the BHEL and the Customer (KPCL) for the full life of the equipment covered under the contract and that before going out of production of spare parts of the equipment covered under the contract, vendor and his sub-vendors shall give the BHEL and the Customer (KPCL) at least 24 (Twenty Four) months advance notice so that the latter may order his bulk requirements of spares, if he so desires. The same provision will also be applicable to the sub-vendors. Further, in case of discontinuance of manufacture of any spares by the vendors or his sub-vendors the vendors and his sub-vendors, will provide the BHEL and the Customer (KPCL), 2 (two) years in advance, with full manufacturing drawings, material specifications and technical information required by the BHEL and the Customer (KPCL) for the purpose of manufacture of such items and also the right to manufacture such spares for their own requirements.
- iv. Further in case of discontinuance of supply of spares by the vendors or his sub-vendors, the vendor will provide the BHEL and the Customer (KPCL) with full information for replacement of such spares with other equivalent makes, if so required by the BHEL and the Customer (KPCL).
- v. Notwithstanding the above, the vendor shall be responsible for supply of spares for the lifetime of the package at reasonable prices. The prices of all future requirements of spares shall be derived from the corresponding ex-works price at which the orders for such spares have been placed by the BHEL and the Customer (GSECL) as a part of the mandatory or long term or any other kind of spares. The base indices for calculating ex-works price shall be commissioning of last equipment under main contract.

5.0 The vendor will indicate the delivery period of the spares, which the BHEL and the Customer (KPCL) may procure in accordance with this clause.

6.0 In case of emergency requirements of spares, the vendor would make every effort to expedite the manufacture and delivery of such spares on the basis of mutually agreed time schedule.

7.0 In case the vendor fails to supply the mandatory or long term or any other kind of spares on the terms stipulated above, the BHEL and the Customer (KPCL) shall be entitled to purchase the same from the alternate sources at the risk and the cost of the vendor and recover from the vendor, the excess amount paid by the BHEL and the Customer (KPCL) over the rates as per the contract. In the event of such risk purchase by the BHEL or the Customer (KPCL), the purchases will be as per the works and procurement policy of the BHEL and the Customer

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(KPCL) prevalent at the time of such purchases and BHEL & the Customer (KPCL) at his option may include a representative from the vendor in finalizing the purchases.

8.0 It is expressly understood that the final settlement between the parties in terms of relevant clauses of the tender document shall not relieve the vendor of any of his obligations under the provision of long term availability of spares and such provisions shall continue to be enforced till the expiry of 30 (thirty) years period reckoned from the scheduled date of completion of trial operation of the last equipment unless otherwise discharged expressly in writing by the BHEL or the Customer (KPCL) .

16.0 DRAWINGS/DOCUMENTATION REQUIREMENT ALONG WITH BID

Bidder to refer “Volume-III” for list of documents submitted along with bid.

17.0 MISCELLANEOUS REQUIREMENTS

- a. Initial charge of all lubricants & grease.
- b. All special tools necessary for proper maintenance or adjustment of the equipment packaged in permanent box. Finish paints for touch-up painting of equipment after erection at site in sealed container.
- c. All the first fill and one Year's topping requirements or 10 % of first fill quantity, whichever is more of consumable such as greases, oil, lubricants, servo fluids/control fluids, gases and etc. which will be required to put the equipment covered under the scope of specifications, into successful commissioning / initial operation and to establish completion of facilities shall be furnished by the bidder. Suitable standard lubricants as available in India are desired. Efforts should be made to limit the variety of lubricants to minimum.
- d. Document approval by Customer (KPCL) under Approval category or information category shall not absolve the vendor of their contractual obligations of completing the work as per specification requirement. Any deviation from specified requirement shall be reported by the vendor in writing and require written approval. Unless any change in specified requirement has been brought out by the vendor during detail engineering in writing while submitting the document to Customer (KPCL) for approval, approved document (with implicit deviation) will not be cited as a reason for not following the specification requirement.
- e. In case vendor submits revised drawing after approval of the corresponding drawing, any delay in approval of revised drawing shall be to vendor's account and shall not be used as a reason for extension in contract completion. However, in case changes are necessitated due to any constraints at Customer (KPCL) end, delay in review/ approval of drawing beyond one month will be to Customer (KPCL) 's account.
- f. Bidders shall make Site visit in order to familiarize themselves with existing condition of site before submitting the bid in order to make their offer complete. During detail engineering also, the successful bidder shall be responsible for the correctness of details w.r.t. existing facility at site. Customer (KPCL) approval on any drawing having details of existing facility shall not be cited by the successful bidder a valid reason for any shortcoming in the work by them. BHEL shall also not entertain any cost implication for any lack of input data with regard to site during detail engineering.
- g. Successful bidder shall furnish detailed erection manual for each of the equipment supplied under this contract at least 3 months before the scheduled erection of the concerned equipment / component or along with supply of concerned equipment / component whichever is earlier.
- h. Final Electrical Load list will be submitted by the successful bidder as per agreed drawing/ doc submission schedule. Thereafter any change in the electrical load list shall be entertained only subject to its feasibility, and BHEL reserves the right to debit the vendor cost of any changes necessitated in the BHEL's switch gear /MCC on account of changed loads.
- i. Wherever CIVIL works is excluded from the bidder's scope, successful bidder shall furnish civil assignment / scope drawings. The corresponding CIVIL drawing prepared by BHEL / CIVIL agency, based on civil assignment drawing of bidder will be furnished to the successful bidder for concurrence. In case any modification is required in the civil work already carried out based on final civil inputs given by vendor, BHEL reserves the right to debit cost of such rework to vendor”.

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- j. Bidder to submit BBU during detailed engineering after approval of Basic documents. BBU shall be equal to BOQ for the package and there shall be no price and delivery implication is applicable to BHEL / CUSTOMER (GSECL) for the same. None of the items supplied for the project as non-billable. Incomplete BBU shall not be review by BHEL.
- k. Training of plant Owner's personnel, O&M operators' personnel on plant operation and maintenance.
- l. Bidder to take care for cooling/ lubrication of the pumps being supplied by the bidder under this technical specification. If service water pressure requirement is more than available pressure, bidder to consider two (2) nos. cooling pump for package.
- m. Relevant requirements as per GTR, GCC, ECC & SCC. Any statutory requirement / clearance required for the packages from government / local body shall be in bidder's scope.
- n. In case of any conflict and repetition of clauses in the specification, the more stringent requirements among them are to be complied with.
- o. Vendor to attend regular engineering meeting with BHEL and Customer (KPCL) fortnightly in BHEL or Customer (KPCL) office as decided during detail engineering. Vendor will depute his entire concerned engineering representatives along with the project manager for discussion and approval. Meeting can be held at site also.
- p. Latest version of all codes and standards to be followed.
- q. Skid El 0.0 should be equal to 0.1 m plus TG hall FFL. This should be taken care in GA drawing.
- r. For detailed dispatch instructions, Bidder to refer special condition of contract (SCC) of the project.



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SECTION – C1-D QUALITY ASSURANCE

ANNEXURE-VII
(INSPECTION TESTING)

		MANUFACTURER'S NAME & ADDRESS :		QUALITY PLAN				PROJECT 1X370 MW YELAHANKA COMBINED CYCLE POWER PLANT PACKAGE CONTRACT NO. CHEMICAL DOSING SYSTEM (HIGH & LOW) MAIN SUPPLIER BHEL/PEM, NOIDA				
				ITEM: CHEMICAL DOSING SYSTEM (HIGH & LOW)		QP.NO : PE - VE-409-154A-006						
				SUB - SYSTEM : CHEMICAL DOSING SYSTEM		REV. : 1 DATE : PAGE : 1 OF 4						
S.NO.	COMPONENTS/ OPERATION	CHARACTERISTICS CHECKED	CATEGORY	TYPE/ METHOD CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORDS	AGENCY**			REMARKS
1	2	3	4	5	6	7	8	9	M	B	R	11
1.0	WELDER'S QUALIFICATION											
1.1	WELDING PROCEDURE SPECIFICATION (WPS)	CORRECTNESS	MA	SCRUTINY	100%	ASME IX	ASME IX	QW 482	P	V	V	
1.2	WELDER PERFORMANCE & PROCEDURE QUALIFICATION RECORD	WELD SOUNDNESS & WELDING PERFORMANCE	MA	PHYSICAL TEST	ASME IX	ASME IX	ASME IX	QW 483 & QW 484	P	V	V	
2.0	TANKS											
2.1	RAW MATERIAL :											
2.1.1	PLATE	CHEMICAL & PHY. PROPERTIES	MA	CHEM & PHY TEST	1/PLATE/HT BATCH	ASTM A 240 GR.TP 304	ASTM A 240 GR.TP 304	MFG.TC/LAB REPORT	P	V	V	IDENTIFICATION BY BHEL
		IGC TEST	MI	IGC TEST	1/PLATE/HT BATCH	ASTM A 262 PR.'E'	ASTM A 262 PR.'E'					
2.1.2	PIPE FOR NOZZLE	CHEMICAL & PHY. PROPERTIES	MA	CHEM & PHY TEST	1/HT BATCH/SIZE	ASTM A 312 GR.TP 304	ASTM A 312 GR.TP 304	MFG.TC/LAB REPORT	P	V	V	
		MICRO STRUCTURE	MI	GRAIN STRUCTURE	1/HT BATCH/SIZE	FOR HEAT TREATMENT	FOR HEAT TREATMENT	MFG.TC/LAB REPORT	P	V	V	
		IGC TEST	MI	IGC TEST	1/HT BATCH/SIZE	ASTM A 262 PR.'E'	ASTM A 262 PR.'E'	MFG.TC/LAB REPORT	P	V	V	
		HYDRO TEST	NA	LEAKAGE	100%	NO LEAKAGE	NO LEAKAGE	MFG. TC/IR	P	V/W	V	REFER NOTE 4
2.1.3	FLANGES FOR TANKS	CHEMICAL & PHY PROPERTIES	MA	CHEM & PHY TEST	1/HT BATCH	ASTM A 182 GR. F 304	ASTM A 182 GR. F 304	MFG.TC/LAB REPORT	P	V	V	
2.2	IN PROCESS											
2.2.1	DISHED ENDS	DIMENSIONS	MA	MEASUREMENT WITH TEMPLATE	100%	APPD.DWG.(BY BHEL)	APPD.DWG.(BY BHEL)	MFG.TC./LAB REPORT	P	V	V	
		SURFACE DEFECTS ON WELDMENTS		DP TEST	100%	ASTM E 165	NO SURFACE DEFECTS	MFG.TC	P	V	V	
2.3	FINAL ASSEMBLY FOR TANKS:	DIMENSIONS & ORIENTATION	MA	MEASUREMENT	100%	APPD.DWG.(BY BHEL)	APPD.DWG.(BY BHEL)	MFG.TC/INSP REPORT	P	W	W	TO BE OFFERED ALONG WITH FINAL SKID ASSEMBLY INSPECTION.
2.3.1		LEAKAGE	MA	WATER FILL FOR 2 HR	100%	APPD.DWG.(BY BHEL)	APPD.DWG.(BY BHEL)	MFG.TC/INSP REPORT	P	W	W	
3.0	STIRRER :											
3.1	RAW MATERIAL FOR SHAFT	CHEM.& PHY. PROPERTIES	MA	CHEM & PHY TEST	1/BAR	ASTM A 479 GR.TP 304	ASTM A 479 GR.TP 304	MFG.TC/LAB REPORT	P	V	V	
		IGC TEST	MA	IGC TEST	1/HT BATCH	ASTM A 262 PR.'E'	ASTM A 262 PR.'E'	MFG.TC/LAB REPORT				
3.2	IMPELLER	CHEMICAL PROP.	MA	CHEMICAL TEST	1/PLATE	ASTM A 240 GR.TP 316	ASTM A 240 GR.TP 316	MFG.TC/LAB REPORT	P	V	V	
3.3	COMPLETE STIRRER UNIT WITH MOTOR	PERFORMANCE IN WATER FILLED TANK										
		- VIBRATION	MA	MEASUREMENT	100%	BHEL APPD.DATA SHEET	BHEL APPD.DATA SHEET	MFG.TC	P	V	V	
		- WOBBLING	MA	VISUAL	100%	NO WOBBLING	NO WOBBLING	MFG.TC	P	V	V	
		- POWER CONSUMPTION/ CURRENT DRAWN	MA	MEASUREMENT	100%	BHEL APPD.DATA SHEET	BHEL APPD.DATA SHEET	MFG.TC	P	V	V	
4.0	MOTORS:	ROUTINE TEST	MA	MFG. TC	100%	BHEL APPD.DATA SHEET	BHEL APPD.DATA SHEET	MFG.TC	P	V	V	
		TYPE TEST	MA	MFG. TC	1/ SIMILAR FRAME SIZE	BHEL APPD.DATA SHEET	BHEL APPD.DATA SHEET	MFG.TC	P	V	V	
		DEGREE OF PROTECTION	MA	MFG. TC	1/ SIMILAR FRAME SIZE	BHEL APPD.DATA SHEET	BHEL APPD.DATA SHEET	MFG.TC	P	V	V	
				** LEGEND : M : MANUFACUTRER/SUB-CONTRACTOR/SUB-VENDOR B : BHEL/NOMINATED INSPECTION AGENCY "P" PERFORM, "W" WITNESS, AND "V" VERIFICATION								
MANUFACTURER/ SUB CONTRACTOR		MAIN SUPPLIER--BHEL		R : GSECL								
SIGNATURE								SIGNATURE OF APPROVAL BY CUSTOMER				

THIS IS A PART OF TECHNICAL SPECIFICATION PE-TS-409-154A-001,R01

ANNEXURE-VII
(INSPECTION TESTING)

		MANUFACTURER'S NAME & ADDRESS :		QUALITY PLAN				PROJECT					
				ITEM: CHEMICAL DOSING SYSTEM (HIGH & LOW)		Q.P. NO : PE - VE-409-154A-006		PACKAGE CONTRACT NO. CHEMICAL DOSING SYSTEM (HIGH & LOW)		MAIN SUPPLIER BHEL/PEM, NOIDA			
				SUB - SYSTEM : CHEMICAL DOSING SYSTEM		REV. : 1							
				DATE :		PAGE : 2 OF 4							
S.NO.	COMPONENTS/ OPERATION	CHARACTERISTICS CHECKED	CATEGORY	TYPE/ METHOD CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORDS	AGENCY**			REMARKS	
1	2	3	4	5	6	7	8	9	M	B	R	11	
5.0	METERING PUMP:												
5.1	RAW MATERIAL :												
5.1.1	WETTED PARTS	CHEM & PHY. PROPERTIES	MA	CHEM. & PHY. TEST	1/BAR	BHEL APPD.DATA SHEET	BHEL APPD.DATA SHEET	MFG.TC/LAB REPORT	P	V	V		
		SURFACE TEST	MI	UT ON BAR>25 MM DIA	100%	ASTM A 388	REF. NOTE # 1	MFG.TC/LAB REPORT	P	V	V		
				DP ON M/C SURFACE	100%	ASME - E - 165	NO SURFACE DEFECTS	MFG.TC/LAB REPORT	P	V	V		
5.2	FINAL INSPECTION												
5.2.1	PUMP WITH MOTOR	LINEARITY	MA	PERFORMANCE	100%	API 675	API 675	INSPECTION REPORT	P	W	V	SHALL BE TESTED WITH EITHER JOB MOTOR OR SHOP MOTOR OF SIMILAR FRAME SIZE	
		STEADY STATE ACCURACY	MA	SHOP TEST	100%	API 675	API 675	INSPECTION REPORT	P	W	V		
		REPEATABILITY	MA	SHOP TEST	100%	API 675	API 675	INSPECTION REPORT	P	W	V		
		POWER DRAWN @ 100% STROKE	MA	MEASURED AT WORK	100%	BHEL APPD.DATA SHEET	BHEL APPD.DATA SHEET	INSPECTION REPORT	P	W	V		
		LEAKAGE	MA	HYDRO TEST	100%	@1.5X DESIGN PRESSURE	NO LEAKAGE	INSPECTION REPORT	P	W	V		
		DIMENSIONS	MA	MEASUREMENT	100%	BHEL APPD.DATA SHEET/DWG	BHEL APPD.DATA SHEET/DWG	INSPECTION REPORT	P	W	V		
		NOISE	MA	MEASUREMENT	100%	--	< 85 dbA AT 1 M RADIUS	INSPECTION REPORT	P	W	V		
		VIBRATION	MA	MEASUREMENT	100%	--	≤45 MICRONS (PEAK TO PEAK)	INSPECTION REPORT	P	W	V		
7.0	PRESSURE RELIEF VALVE	SET & RESET PRESSURE.	MA	PERFORMANCE	100%	BHEL APPD.DATA SHEET & API RP-520	BHEL APPD.DATA SHEET & API RP-520	MFG. TC	P	V	V		
		DIMENSIONS	MA	MEASUREMENT	100%	BHEL APPD.DATA SHEET/DWG	BHEL APPD.DATA SHEET/DWG	MFG. TC	P	V	V		
		LEAKAGE DURING PERFORMANCE TEST	MA	VISUAL	100%	NO LEAKAGE	NO LEAKAGE	MFG. TC	P	V	V		
8	VALVES (GATE, GLOBE & NRV)												
8.1	RAW MATERIAL :												
8.1.1	BODY, BONNET COVER	CHEM.& PHY PROPERTIES	MA	CHEM.& PHY TEST	1/HT BATCH	BHEL APPD.DATA SHEET	BHEL APPD.DATA SHEET	MFG. TC/LAB REPORT	P	V	V		
		HEAT TREATMENT	MA	HEAT TREATMENT	1/HT BATCH	BHEL APPD.DATA SHEET	BHEL APPD.DATA SHEET	MFG. TC/LAB REPORT	P	V	V		
8.1.2	TRIM MATERIAL	CHEM.& PHY PROPERTIES	MA	CHEM.& PHY TEST	1/BAR/SIZE	BHEL APPD.DATA SHEET	BHEL APPD.DATA SHEET	MFG. TC/LAB REPORT	P	V	V		
8.2	ASSEMBLY												
		LEAKAGE (BODY & SEAT)		HYDRO TEST	100%	BHEL APPD.DATA SHEET	NO LEAKAGE	MFG TC	P	V	V		
		LEAKAGE (SEAT)		PNEUMATIC TEST	100%	BHEL APPD.DATA SHEET	NO LEAKAGE	MFG TC	P	V	V		
		DIMENSIONS		MEASUREMENT	100%	BHEL APPD.DATA SHEET/DWG	BHEL APPD.DATA SHEET/DWG	MFG TC	P	V	V		
MANUFACTURER/ SUB CONTRACTOR		MAIN SUPPLIER--BHEL		** LEGEND : M : MANUFACTURER/SUB-CONTRACTOR/SUB-VENDOR B : BHEL/NOMINATED INSPECTION AGENCY "P" PERFORM, "W" WITNESS, AND "V" VERIFICATION				R: GSECL					
SIGNATURE		SIGNATURE OF APPROVAL BY CUSTOMER											
THIS IS A PART OF TECHNICAL SPECIFICATION PE-TS-409-154A-001,R01													

ANNEXURE-VII
(INSPECTION TESTING)

		MANUFACTURER'S NAME & ADDRESS :		QUALITY PLAN				PROJECT 1X370 MW YELAHANKA			
				ITEM: CHEMICAL DOSING SYSTEM (HIGH & LOW)		QP NO : PE - VE-409-154A-006		PACKAGE CONTRACT NO. CHEMICAL DOSING SYSTEM (HIGH & LOW)			
				SUB - SYSTEM : CHEMICAL DOSING SYSTEM		REV. : 1					
						DATE :					
				PAGE : 3 OF 4		MAIN SUPPLIER BHEL/PEM, NOIDA					
S.NO	COMPONENTS/ OPERATION	CHARACTERISTICS CHECKED	CATEGORY	TYPE/ METHOD CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORDS	AGENCY**		
1	2	3	4	5	6	7	8	9	M	B	R
9.0	FITTING/FLANGES FOR PIPING:										
9.1	RAW MATERIAL	CHEM.& PHY PRPERTIES	MA	CHEM.& PHY TEST	1/HT BATCH	ASTM A 182 GR.TP 304	ASTM A 182 GR.TP 304	MFG.TC/LAB REPORT	P	V	V
		HEAT TREATMENT	MA	HEAT TREATMENT	100%	ASTM A 182 GR.TP 304	ASTM A 182 GR.TP 304	MFG.TC/LAB REPORT	P	V	V
		IGC TEST	MI	IGC TEST	1/HT BATCH	ASTM A 262 PR. 'E'	ASTM A 262 PR. 'E'	MFG.TC/LAB REPORT	P	V	V
9.2	FINAL INSPECTION	DIMENSIONS	NA	MEASUREMENT	100%	BHEL APPD.DATA SHEET/DWG/ ANSI B 16.11/16.5	BHEL APPD.DATA SHEET/DWG/ ANSI B 16.11/16.5	MFG.TC	P	V	V
10.0	STRAINERS :										
10.1	RAW MATERIAL FOR BODY	PHY. & CHEM. PROPERTIES	MA	PHY. & CHEM.TEST	1/BAR/SIZE	BHEL APPD.DATA SHEET	BHEL APPD.DATA SHEET	MFG.TCLAB REPORT	P	V	V
10.2	SCREEN	CHEMICAL	MA	CHEMICAL	1/SIZE	BHEL APPD.DATA SHEET	BHEL APPD.DATA SHEET	MFG.TC/LAB REPORT	P	V	V
		MESH SIZE	MA	MEASUREMENT	1/SIZE	BHEL APPD.DATA SHEET	BHEL APPD.DATA SHEET	MFG.TC/LAB REPORT	P	V	V
10.3	FINAL INSPECTION	DIMENSIONS	MA	MEASUREMENT	100%	BHEL APPD.DATA SHEET	BHEL APPD.DATA SHEET	MFG.TC	P	V	V
		LEAKAGE		HYDRO TEST	1	BHEL APPD.DATA SHEET	NO LEAKAGE	MFG.TC	P	V	V
11.0	PIPE (SEAMLESS)										
11.1	MATERIAL	CHEMICAL	MA	CHEMICAL	1/HT BATCH/SIZE	ASTM A 312 GR.TP 304	ASTM A 312 GR.TP 304	MFG.TC/LAB REPORT	P	V	V
		MECHANICAL TEST	MA	MECHANICAL TEST	1/HT BATCH/SIZE	ASTM A 312 GR.TP 304	ASTM A 312 GR.TP 304	MFG.TC/LAB REPORT	P	V	V
		MICRO STRUCTURE	MI	GRAINS STRUCTURE	1/HT BATCH/SIZE	FOR HEAT TREATMENT	FOR HEAT TREATMENT	MFG.TC/LAB REPORT	P	V	V
		IGC TEST	MI	IGC TEST	1/HT BATCH/SIZE	ASTM A 262 PR 'E'	ASTM A 262 PR 'E'	MFG.TC/LAB REPORT	P	V	V
		HYDRO TEST	MA	LEAKAGE	100%	NO LEAKAGE	NO LEAKAGE	MFG.TC/IR	P	V/W	V
12.0	LEVEL GAUGE :										
12.1	RAW MATERIAL	CHEM.PROPERTIES	MA	CHEM.TEST	1/HT BATCH	BHEL APPD.DATA SHEET	BHEL APPD.DATA SHEET	MFG.TC/LAB REPORT	P	V	V
12.2	FINAL INSPECTION	DIMENSION	MA	MEASUREMENT	100%	BHEL APPD.DATA SHEET	BHEL APPD.DATA SHEET	MFG.TC	P	V	V
		LEAKAGE	MA	HYDRO TEST	100%	BHEL APPD.DATA SHEET	NO LEAKAGE	MFG.TC	P	V	V
13.0	PRESSURE & DP GAUGE										
13.1	MAT. FOR WETTED PARTS & BOURN	CHEM.PROPERTIES	MA	CHEM.TEST	1/HT BATCH	BHEL APPD.DATA SHEET	BHEL APPD.DATA SHEET	MFG.TC/LAB REPORT	P	V	V
13.2	FINAL INSPECTION	DIMENSIONS	MA	MEASUREMENT	100%	BHEL APPD.DATA SHEET/DWG	BHEL APPD.DATA SHEET/DWG	MFG.TC/LAB REPORT			
13.3	PERFORMANCE	ACCURACY & OVERLOAD PROTECTION	MA	CALIBRATION	100%	BHEL APPD.DATA SHEET	BHEL APPD.DATA SHEET	MFG. TC	P	V	V
14.0	SWITCHES(LEVEL, PRESURE & DP) & TRANSMITTERS (LEVEL, PRESSURE & DP):										
14.1	MAT. FOR WETTED PARTS	CHEM.PROPERTIES	MA	CHEM.TEST	1/HT BATCH	BHEL APPD.DATA SHEET	BHEL APPD.DATA SHEET	MFG.TC/LAB REPORT	P	V	V
14.2	PERFORMANCE	FUNCTIONAL	MA	CALIBRATION & VISUAL	100%	BHEL APPD.DATA SHEET	BHEL APPD.DATA SHEET	MFG.TC	P	V	V
		IR-HV-IR		ELECTRICAL	100%	BHEL APPD.DATA SHEET	BHEL APPD.DATA SHEET	MFG.TC	P	V	V
		DIMENSIONS		MEASUREMENT	100%	BHEL APPD.DATA SHEET/DWG	BHEL APPD.DATA SHEET/DWG	MFG.TC	P	V	V
		DEGREE OF PROTECTION	MI	VERIFICATION OF TYPE TEST CERT	TYPE TEST	BHEL APPD.DATA SHEET	BHEL APPD.DATA SHEET	MFG.TC/LAB REPORT	P	V	V
		** LEGEND :									
MANUFACTURER/ SUB CONTRACTOR		MAIN SUPPLIER--BHEL		M : MANUFACUTRER/SUB-CONTRACTOR/SUB-VENDOR B : BHEL/NOMINATED INSPECTION AGENCY "P" PERFORM, "W" WITNESS, AND "V" VERIFICATION				R: GSECL			
SIGNATURE								SIGNATURE OF APPROVAL BY CUSTOMER			

THIS IS A PART OF TECHNICAL SPECIFICATION PE-TS-409-154A-001,R01

ANNEXURE-VII
(INSPECTION TESTING)

		MANUFACTURER'S NAME & ADDRESS :		QUALITY PLAN				PROJECT 1X370 MW YELAHANKA COMBINED CYCLE POWER PLANT PACKAGE CONTRACT NO. CHEMICAL DOSING SYSTEM (HIGH & LOW) MAIN SUPPLIER BHEL/PEM, NOIDA				
				ITEM: CHEMICAL DOSING SYSTEM (HIGH & LOW)		QP.NO : PE - VE-409-154A-006						
				SUB - SYSTEM : CHEMICAL DOSING SYSTEM		REV. : 1 DATE : PAGE : 4 OF 4						
S.NO.	COMPONENTS/ OPERATION	CHARACTERISTICS CHECKED	CATEGORY	TYPE/ METHOD CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORDS	AGENCY**			REMARKS
									M	B	R	
1	2	3	4	5	6	7	8	9	10			11
15.0	CONTROL PANEL :	DIMENSIONS	MA	MEASUREMENT	100%	BHEL APPD.DATA SHEET/DWG	BHEL APPD.DATA SHEET/DWG	INSPECTION REPORT	P	W	W	CONTOL PANEL TEST TO BE OFFERED ALONG WITH FINAL SKID ASSEMBLY.
		CONTINUITY, IR-HV-IR	MA	ELECTRICAL	100%	BHEL APPD.DATA SHEET/DWG	BHEL APPD.DATA SHEET/DWG	INSPECTION REPORT	P	W	W	
		VERIFICATION OF MAKE	MA		100%	BHEL APPD.DATA SHEET/DWG	BHEL APPD.DATA SHEET/DWG	INSPECTION REPORT	P	W	W	
		RATING OF COMPONENTS	MA		100%	BHEL APPD.DATA SHEET/DWG	BHEL APPD.DATA SHEET/DWG	INSPECTION REPORT	P	W	W	
		PAINT SHADES, THICKNESS	MA		100%	BHEL APPD.DATA SHEET/DWG	BHEL APPD.DATA SHEET/DWG	INSPECTION REPORT	P	W	W	
		ADHESION	MA		100%	BHEL APPD.DATA SHEET/DWG	BHEL APPD.DATA SHEET/DWG	INSPECTION REPORT	P	W	W	
16.0	COMPLETE SKID ASSEMBLY:	DEGREE OF PROTECTION	MI	VERIFICATION OF TYPE TEST CERTIFICATE	TYPE TEST	BHEL APPD.DATA SHEET/DWG	BHEL APPD.DATA SHEET/DWG	MFG.TC/LAB REPORT	P	V	W	
		DIMENSIONS & ORIENTATION	CR	MEASUREMENT	100%	BHEL APPD.DATA SHEET/DWG	BHEL APPD.DATA SHEET/DWG	INSPECTION REPORT	P	W	W	
		LEAKAGE, CHECK ON WELDMENTS		VISUAL & HYDRO TEST	100%	DISCH.PIPING - 1.5 x DISCH PR. OF PUMP	NO LEAKAGE	INSPECTION REPORT	P	W	W	
		FUNCTIONAL TEST FOR INTERLOCKS	MA	VISUAL	100%	BHEL APPD.DATA SHEET/DWG	BHEL APPD.DATA SHEET/DWG	INSPECTION REPORT	P	W	W	
		PAINTING	MA	VISUAL & MEASUREMENT	100%	BHEL APPD PAINTING SCHEME	APPD DWG/PAINTING	INSPECTION REPORT	P	W	W	
17.0 PACKING OF SYSTEM INSPECTION ALONG WITH SPARES												
	PACKING OF SYSTEM	DIMENSION OF PACKING IN ASSEMBLED CONDITION / TRANSPORT WORTHY PACKING	MA	DIMENSION / VISUAL	100%	PACKING DRAWING / BHEL APPROVED PACKING PROCEDURE	PACKING DRAWING / BHEL APPROVED PACKING PROCEDURE	CLAEARNCE REPORT FROM BHEL + PHOTOS AFTER SYSTEM PACKING	P	W	W	
	LOOSE ITEM PACKING	SPARE PACKING WITH SPARE LIST COPY VERIFICATION	MA	CHECK SPARE WITH LIST AND PACKING	100%	SPARE LIST AS PER PO	SPARE LIST AS PER PO	REPORT OF CHECKING SPARES	P	W	W	
NOTE-1) WHEN BACK WALL ECHO IS SET TO 100% OF FSH IN SOUND AREA, DEFECT ECHO SHALL NOT EXCEED 20% OF FSH. MAX BACH WALL ECHO IS 20% OF FSH. TOTAL NO OF DEFECTS SHALL BE MAX. 5 NO IN ONE METER LENGTH. MIN DISTANCE BETWEEN TWO DEFECTS SHALL BE 3 TIMES THE DIA OF BAR.												
NOTE-2) CHEMICAL DOSING SKID VENDOR SHALL BE SELECTED FROM CUSTOMER APPROVED SOURCES. ALL THE BOUGHT OUT ITEMS OF THE CHEMICAL DOSING VENDOR SHALL BE PROCURED FROM BHEL APPROVED SOURCES.												
NOTE- 3) ALL VENDOR DRAWINGS/DATASHEETS SHALL BE APPROVED BY BHEL. ONLY MANUFACTURING QP(PREPARED IN LINE WITH THIS STANDARD QP) OF THE VENDOR SHALL BE FORWARDED FOR CUSTOMER APPROVAL. ALL THE BHEL APPROVED DOCUMENTS SHALL BE FURNISHED TO CUSTOMER FOR INFORMATION/RECORDS ALONG WITH O&M MANUAL. COPY OF THE SAME SHALL ALSO BE FURNISHED TO INSPECTION AGENCY DURING INSPECTION.												
NOTE 4) FOR PIPES PURCHASED DIRECTLY FROM MANUFACTURER'S OR AUTHORIZED DEALERS, APART FROM TC REVIEW, CHECK WILL BE AS PER CLAUSE 2.1.2 AND 10.0; HOWEVER FOR HYDRAULIC TEST, MANUFACTURER TC SHALL BE REVIEWED . IN CASE ON IMPORTED PIPES PURCHASED FROM OPEN MARKET, TEST SHALL BE PERFORMED AS PER CLAUSE 2.1.2 AND 10.0 (INCLUDING HYDRAULIC TEST).												
NOTE 5) FOR RAW MATERIAL (BARS/PIPES/CASTINGS/FORGINGS) WHERE HEAT TREATMENT ARE CARRIED OUT BY MATERIAL PRODUCERS ON BULK QUANTITIES, THEIR TEST CERTIFICATE SHALL BE REVIEWED (EXCEPT TIME TEMPERATURE CHART)												
NOTE 6) NDT REQUIREMENT ON WELDING (TANK, PIPE, BREATHER/WATER SEAL/CO2 ABSORBER) SHALL BE AS -- A) ON BUTT WELD-- 25% DP & 25% RT FOR PUMP SUCTION SIDE & 100% DP & 100% RT FOR PUMP DISCHARGE SIDE. B) ON FILLET WELD--100% DP TEST												
				** LEGEND : M : MANUFACUTRER/SUB-CONTRACTOR/SUB-VENDOR B : BHEL/NOMINATED INSPECTION AGENCY R : GSECL								
SIGNATURE		MAIN SUPPLIER--BHEL		"P" PERFORM, "W" WITNESS, AND "V" VERIFICATION				SIGNATURE OF APPROVAL BY CUSTOMER				
THIS IS A PART OF TECHNICAL SPECIFICATION PE-TS-409-154A-001,R01												



TITLE:
KARNATAKA POWER CORPORATION LIMITED
1x370 MW KPCL YELAHANKA CCPP
TECHNICAL SPECIFICATION FOR CHEMICAL DOSING SYSTEM

SPEC NO: PE-TS-409-154-A001

VOLUME: IIB

SECTION: C1-E

REV NO: 01

DATE:

SECTION – C1-E PAINTING SPECIFICATION



TITLE:
KARNATAKA POWER CORPORATION LIMITED
1x370 MW KPCL YELAHANKA CCPP
TECHNICAL SPECIFICATION FOR CHEMICAL DOSING SYSTEM

SPEC NO: PE-TS-409-154-A001

VOLUME: IIB

SECTION: C1-E

REV NO: 01

DATE:

1.0 SCOPE

- 1.1 This section covers the painting requirements for the power plant equipment, structures, piping etc. and any other surface required to be painted.

2.0 CODES AND STANDARDS

Painting of equipment shall be carried out as per the specifications indicated below and shall conform to the relevant IS specification for the material and workmanship.

The following Indian Standards may be referred to for carrying out the painting job :

IS:5	:	Colours for ready mixed paints and enamels
IS:1303	:	Glossary of terms relating to paints
IS:2379	:	Colour code for identification of pipelines
IS:1477	:	Code of practice for painting of ferrous metals in buildings (Parts I & II)
IS:2524	:	Code of practice for painting of non-ferrous metals in buildings (Parts I & II)
IS:2395	:	Code of practice for painting of concrete, masonry and plaster surfaces (Parts I & II)
IS:2338	:	Code of practice for finishing of wood and wood based materials (Parts I & II)
IS:6278	:	Code of practice for white washing and colour Washing
IS:3140	:	Code of practice for painting asbestos cement building products
IS:158	:	Ready mixed paint, brushing, bituminous, black, lead-free, acid, alkali, water and heat resisting
IS:2074	:	Ready mixed paint, air drying, red Oxide Zinc Chrome, priming
IS:104	:	Ready mixed paint, brushing, Zinc Chrome, priming
IS: 2932	:	Enamel , synthetic, exterior (a) undercoating (b) finishing

2.0 PREPARATION OF SURFACES

All surfaces to be painted shall be thoroughly cleaned of all grease, oil, loose mill scale, dust, rust and any other foreign matter. Mechanical cleaning by power tool and scrapping with steel wire brushes shall be adopted to clear the surfaces. However, in certain locations where power tool cleaning cannot be carried out, sand scrapping may be permitted with steel wire brushes and/or abrasive paper. Cleaning with solvents shall be resorted to only in such areas where other methods specified above have not achieved the desired results. Cleaning with solvents shall be adopted only after written approval of the BHEL/Customer.

4.0 PRIMER PAINT

After the surface is prepared, one coat of Zinc Phosphate primer conforming to IS:2074 shall be applied. After this first coat is dried up completely, second coat of red oxide primer shall be applied. Primer shall be applied by brushing to ensure a continuous film without 'holidays'. The dry film thickness of each coat shall be minimum 30 microns.

5.0 FINISH PAINT

Synthetic enamel paint conforming to IS:2932 shall be used for finish coats. The colour/shade shall be as approved by the OWNER. After cleaning the dust on the dried up primer, first coat of synthetic enamel shall be applied. After this first coat dries up hard, the surface is wet scrubbed cutting down to a smooth finish and ensuring that at no place the first coat is completely removed. After allowing the water to get evaporated completely, the second finish coat of synthetic enamel paint shall be applied.



TITLE:
KARNATAKA POWER CORPORATION LIMITED
1x370 MW KPCL YELAHANKA CCPP
TECHNICAL SPECIFICATION FOR CHEMICAL DOSING SYSTEM

SPEC NO: PE-TS-409-154-A001

VOLUME: IIB

SECTION: C1-E

REV NO: 01

DATE:

6.0 SUGGESTED COLOUR CODES FOR PAINTING

SL. NO.	ITEM/SERVICE	COLOUR	IS-5 Grade	COLOUR (BAND)	IS-5
1.0	Structures, platforms, galleries, ladders and handrails	Dark Admiralty Grey	632	-	-
2.0	Boiler casing, ESP and ducting	Nut Brown	413	-	-
3.0	Crane				
3.1	Crane structure	Golden Yellow	356	-	-
3.2	Trolley and hook	Crimson	540	-	-
4.0	Fans, pumps, motors, compressors	Light Grey	631	-	-
5.0	Tanks (without insulation and cladding)				
5.1	Outdoor	Aluminium	-	-	-
5.2	Indoor	Light grey	631	-	-
6.0	Vessels & all other proprietary equipment (without insulation & cladding)	Light grey	631	-	-
7.0	Switchgear	Light grey	631	-	-
8.0	Control & relay panels	Light grey	631/7078 of IS 1650	-	-
9.0	Turbine	Golden Yellow	356	-	-
10.0	Generator & exciter	Light grey	631	--	-
11.0	Transformers	Aluminium	-	-	-
12.0	Machinery guards	Signal red	537	-	-
13.0	Piping (without insulation and cladding)				
13.1	Water System				
	Boiler feed	Sea green	217	-	-
	Condensate	Sea green	217	Light brown	410
	D M Water	Sea green	217	Light orange	557
	Soft water	Sea green	217	French blue	166
	Bearing cooling water	Sea green	217	French blue	166
	Potable & filtered water	Sea green	217	French blue	166
	Service & clarified water	Sea green	217	French blue	166
	Raw water	Sea green	217	White	-
	Cooling water	Sea green	217	French blue	166
13.2	Air System				
	Station air	Sky blue	101	-	-
	Control air	Sky blue	101	White	-
13.3	Oil system				
	Fuel oil	Light brown	410	French	166
	Light oil	Light Brown	410	Brilliant green	221
	Lubricating oil	Light brown	410	Light grey	631
	Transformer oil	Light brown	410	Light orange	557
13.4	Gas system				
	Carbon dioxide	Canary yellow	309	Light grey	631
	Hydrogen	Canary yellow	309	Signal red	537
13.5	Fire services	Fire red	536	-	-
13.6	Ash slurry pipes	Black	-	-	-



TITLE:
KARNATAKA POWER CORPORATION LIMITED
1x370 MW KPCL YELAHANKA CCPP
TECHNICAL SPECIFICATION FOR CHEMICAL DOSING SYSTEM

SPEC NO: PE-TS-409-154-A001

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13.7	Vacuum pipes	Sky blue	101	Black	-
13.8	Fuel pipes (pulverised coal)	Light brown	410	-	-
13.9	Drainage	Black	-	-	-

Notes :

1. This colour code basically refers to IS:2379 for piping with necessary modifications
2. Where band colour is specified, same shall be provided at 30 meter intervals on long uninterrupted lines and also adjacent to valves and junctions.
3. The above mentioned painting requirements are bare minimum. Any variation as required by BHEL/customer during detailed engineering stage shall be adhered to the bidder without any delivery/commercial implication to BHEL.



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SECTION – C1-F DATASHEET-A

- LOW PRESSURE CHEMICAL DOSING SYSTEM
- HIGH PRESSURE CHEMICAL DOSING SYSTEM



TITLE:
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1x370 MW KPCL YELAHANKA CCPP
TECHNICAL SPECIFICATION FOR CHEMICAL DOSING SYSTEM

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• **LOW PRESSURE CHEMICAL DOSING SYSTEM**

SL.No.	Description	Hydrazine	Ammonia	NaOH
1.0	Total No. of skid for the station	One (1)	One (1)	One (1)
2.0	Barrel pump (Hand Operated)	One (1)	One (1)	Not Applicable
3.0	Solution Preparation cum MeteringTanks			
3.1	No. of tanks per Skid	One (1)	One (1)	One (1)
3.2	Capacity in litres (each)	350	350	250
3.3	Type	-----Vertical cylindrical, Dished end-----		
3.4	Minimum free board	300 mm	300 mm	300 mm
3.5	Material of the tank	SS-316	SS-316	SS-316
3.6	Thickness	3 mm	3 mm	3 mm
3.7	Motorised Stirrer	Provided	Provided	Provided
3.8	MOC of stirrer	SS-304	SS-304	SS-304
3.9	Dissolving basket	Not Applicable	Not Applicable	Provided (30 mesh B.S.).
3.10	Type of agitator	Motor operated (Propeller type with slow speed reduction gear unit)		
3.11	Design Standard	IS 803/API 650		
4.0	Injection pump:			
4.1	Medium to be handled	0.6-35 % Hydrazine solution	3-15 % Ammonia solution	Not Applicable
4.2	Type of pump	Electromechanical, positive displacement, constant speed variable stroke & plunger type		Not Applicable
4.3	No. of pump-motor assembly (each Skid)	Two (2x100%)	Two (2x100%)	Not Applicable
4.4	Capacity (Each)	30 LPH	30 LPH	Not Applicable
4.5	Discharge pressure	20 Kg/cm2 (g)	20 Kg/cm2 (g)	Not Applicable
4.6	All Wetted parts of pumps	SS-316	SS-316	Not Applicable
4.7	Applicable standard	API 675	API 675	Not Applicable
4.8	Pulsation dampner	Provided	Provided	Not Applicable
4.9	Pressure relief valves	Provided	Provided	Not Applicable
4.10	Type of stroke control	Local manual & automatic	Local manual & automatic	Not Applicable
4.11	Connection at suction, Position	1" ANSI B16.5 #150, bottom	1" ANSI B16.5 #150, bottom	Not Applicable
4.12	Connection at discharge, Position	1" ANSI B16.5 #300, top	1" ANSI B16.5 #300, top	Not Applicable
5.0	Strainers:			
5.1	No. of strainers	Two (2 X 100%)	Two (2 X 100%)	Not Applicable
5.2	Type	Duplex-Type	Duplex-Type	Not Applicable
5.3	Material of boby	SS-316	SS-316	Not Applicable
5.4	Material of screen	SS-316	SS-316	Not Applicable
5.5	Mesh Size	30(BS)	30(BS)	Not Applicable
6.0	Main, Drain, Main Drain Header, Sampling , Vent & Overflow Piping:			
7.1	Material	ASTM A 312 GR TP 304 SCH 40 (Seamless)		
7.2	Diameter	25 NB	25 NB	25 NB
7.0	Valves:			
7.1	Gate & Globe valves	The following parameters are applicable for all three systems.		
7.1.1	Body, Bonnet, Stem	ASTM A182 Gr. TP 316.		
7.1.2	Design standard	ANSI B 16.34/API 602 for gate valves, BS 5352 for globe valve		
7.1.3	Test standard	API 598		
7.1.4	Size	As per P&ID		
7.1.5	End Connections	SW ANSI B 16.11		



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7.1.6	Rating	-----Class ASA 800-----		
7.1.7	Valve operation	Manual operated (As Per P&ID)		
7.2	Check valves/ NRV			
7.2.1	Body, cover, disc/piston	ASTM A182 Gr. TP 316.	ASTM A182 Gr. TP 316.	ASTM A182 Gr. TP 316.
7.2.2	Design standard	ANSI B 16.34/API 602	ANSI B 16.34/API 602	ANSI B 16.34/API 602
7.2.3	Test standard	API 598/MSS-SP-61	API 598/ MSS-SP-61	API 598/ MSS-SP-61
7.2.4	Size	25 NB	25 NB	25 NB
7.2.5	End Connections	SW ANSI B 16.11	SW ANSI B 16.11	SW ANSI B 16.11
7.2.6	Rating	-----Class ASA 800-----		
7.2.7	Valve operation	Manual	Manual	Manual
7.3	Pressure relief valve (PRV)			
7.3.1	Body, bonnet, disc, nozzle	ASTM A182 Gr. TP 316	ASTM A182 Gr.TP 316	Not Applicable
7.3.2	Valve discharges to	Preparation cum Metering Tanks	Preparation cum Metering Tanks	Not Applicable
7.3.3	Back pressure	Constant	Constant	Not Applicable
7.3.4	Set pressure	1.1 Times Design Pressure	1.1 Times Design Pressure	Not Applicable
7.3.5	Inlet Connections	25 NB, Flanged, ANSI B16.5, 300#	25 NB, Flanged, ANSI B16.5, 300#	25 NB, Flanged, ANSI B16.5, 300#
7.3.6	Outlet Connections	25 NB, Flanged, ANSI B16.5, 150#	25 NB, Flanged, ANSI B16.5, 150#	25 NB, Flanged, ANSI B16.5, 150#
8.0	Fittings	Forged steel to A182 F304/316, Dimension to ANSI B 16.11 socket weld ends.		
9.0	Flanges (pump suction / pump discharge)	-----ANSI B 16.5 CL 150 / ANSI B 16.5 CL 300 -----		
10.0	Structural steel	IS 2062	IS 2062	IS 2062
11.0	Step ladder with platform	IS 2062	IS 2062	IS 2062
12.0	Nut & Bolt	ASTM A-193 Gr B7 and ASTM A-194 Gr. 2H respectively.	ASTM A-193 Gr B7 and ASTM A-194 Gr. 2H respectively.	ASTM A-193 Gr B7 and ASTM A-194 Gr. 2H respectively.
13.0	Other items	Checkered plate shall be provided on the base of skid & platform.		



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• **HIGH PRESSURE CHEMICAL DOSING SYSTEM**

SL.No.	Description	Phosphate
1.0	Total No. of skid for the station	One (1)
2.0	Barrel pump (Hand Operated)	Not applicable.
3.0	Solution Metering Tanks	
3.1	No. of tanks per Skid	One (1)
3.2	Capacity in litres (each)	250
3.3	Type	-----Vertical cylindrical, Dished end-----
3.4	Minimum free board	300 mm
3.5	Material of the tank	SS-316
3.6	Thickness	3 mm
3.7	Motorised Stirrer	Provided
3.8	MOC of stirrer	SS-304
3.9	Dissolving basket	Provided (30 mesh B.S.).
3.10	Type of agitator	Motor operated (Propeller type with slow speed reduction gear unit)
3.11	Design Standard	IS 803/API 650
4.0	Solution Preparation Tanks	
4.1	No. of tanks per Skid	One (1)
4.2	Capacity in litres (each)	250
4.3	Type	-----Vertical cylindrical, Dished end-----
4.4	Minimum free board	300 mm
4.5	Material of the tank	SS-316
4.6	Thickness	3 mm
4.7	Motorised Stirrer	Provided
4.8	MOC of stirrer	SS-304
4.9	Dissolving basket	Provided (30 mesh B.S.).
4.10	Type of agitator	Motor operated (Propeller type with slow speed reduction gear unit)
4.11	Design Standard	IS 803/API 650
5.0	Injection pump:	
5.1	Medium to be handled	Phosphate Solution
5.2	Type of pump	Electromechanical, positive displacement, constant speed variable stroke & plunger type
5.3	No. of pump-motor assembly (each Skid)	HP-Two (2X100%) Nos. IP-Two (2X100%) Nos. LP-Two (2X100%) nos.
5.4	Capacity (Each)	HP:0-5 LPH IP:0-5 LPH LP:0-5 LPH
5.5	Discharge pressure	HP:190 Kg/Cm ² IP:60 Kg/Cm ² LP:20 Kg/Cm ²
5.6	All Wetted parts of pumps	SS-316
5.7	Applicable standard	API 675
5.8	Pulsation dampner	Provided
5.9	Pressure relief valves	Provided



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5.10	Type of stroke control	Local manual & automatic	
5.11	Connection at suction, Position	HP,IP & LP-1" ANSI B16.5 #150, bottom	
5.12	Connection at discharge, Position	HP- 1" ANSI B16.5 # 1500, Top IP & LP - 1" ANSI B16.5 # 800, Top	
6.0	Strainers:		
6.1	No. of strainers	Two (2 X 100%)	
6.2	Type	Duplex-Type	
6.3	Material of body	SS-316	
6.4	Material of screen	SS-316	
6.5	Mesh Size	30(BS)	
7.0	Main, Drain, Main Drain Header, Sampling , Vent & Overflow Piping:		
7.1	Material	Suction (HP,IP & LP)	ASTM A 312 TP 304 (Seamless) 40 S
		Discharge (HP)	ASTM A 312 TP 304 (Seamless) 160 S
		Discharge (IP & LP)	ASTM A 312 TP 304 (Seamless) 40 S
		Piping (Other)	ASTM A 312 TP 304 (Seamless) 40 S
7.2	Diameter	25 NB	
8.0	Valves:		
8.1	Gate & Globe valves		
8.1.1	Body, Bonnet, Stem	ASTM A182 Gr. TP 316.	
8.1.2	Design standard	ANSI B 16.34/API 602 for gate valves, BS 5352 for globe valve	
8.1.3	Test standard	API 598	
8.1.4	Size	As per P&ID	
8.1.5	End Connections	SW ANSI B 16.11	
8.1.6	Rating	Suction (HP,IP & LP)	800 Class
		Discharge (HP)	1500 Class
		Discharge (IP & LP)	800 Class
8.1.7	Valve operation	Manual operated (As Per P&ID)	
8.2	Check valves/ NRV		
8.2.1	Body, cover, disc/piston	ASTM A182 Gr. TP 316.	
8.2.2	Design standard	ANSI B 16.34/API 602	
8.2.3	Test standard	API 598/MSS-SP-61	
8.2.4	Size	25 NB	
8.2.5	End Connections	SW ANSI B 16.11	
8.2.6	Rating	Suction (HP,IP & LP)	800 Class
		Discharge (HP)	1500 Class
		Discharge (IP & LP)	800 Class
8.2.7	Valve operation	Manual	
8.3	Pressure relief valve (PRV)		
8.3.1	Body, bonnet, disc, nozzle	ASTM A182 Gr. TP 316	
8.3.2	Valve discharges to	Preparation cum Metering Tanks	
8.3.3	Back pressure	Constant	
8.3.4	Set pressure	1.1 Times Design Pressure	
8.3.5	Inlet Connections	25 NB, Flanged, ANSI B16.5, 1500#-HP 25 NB, Flanged, ANSI B16.5, 800#-IP & LP	
8.3.6	Outlet Connections	25 NB, Flanged, ANSI B16.5, 150#	
9.0	Fittings	Forged steel to A182 F304/316, Dimension to ANSI B 16.11 socket weld ends.	



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10.0	Flanges	Pump suction -ANSI B 16.5 CL 150 Pump discharge (HP) - ANSI B 16.5 CL 1500 Pump discharge (IP & LP) - ANSI B 16.5 CL 800
11.0	Structural steel	IS 2062
12.0	Step ladder with platform	IS 2062
13.0	Nut & Bolt	ASTM A-193 Gr B7 and ASTM A-194 Gr. 2H respectively.
14.0	Other items	Checkered plate shall be provided on the base of skid & platform.



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SECTION – C2
SPECIFIC TECHNICAL REQUIREMENT -ELECTRICAL



TITLE :
ELECTRICAL EQUIPMENT SPECIFICATION
FOR
CHEMICAL DOSING SYSTEM
1 x 370 MW YELAHANKA TPS

SPECIFICATION NO. PE-TS-409-154-A001	
VOLUME NO. :	II-B
SECTION :	C2
REV NO. 00 :	DATE : 19.01.16
SHEET :	1 OF 3

TECHNICAL SPECIFICATION
FOR
CHEMICAL DOSING SYSTEM
(ELECTRICAL PORTION)

	TITLE : ELECTRICAL EQUIPMENT SPECIFICATION FOR CHEMICAL DOSING SYSTEM 1 x 370 MW YELAHANKA TPS	SPECIFICATION NO. PE-TS-409-154-A001
		VOLUME NO. : II-B
		SECTION : C2
		REV NO. 00 : DATE : 19.01.16
		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 **CHEMICAL DOSING SYSTEM, has been stipulated in Elcetrical Load data (Annexure-VIII). Bidder to comply the same.**

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 minimum requirement of motor specification.

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.

	TITLE : ELECTRICAL EQUIPMENT SPECIFICATION FOR CHEMICAL DOSING SYSTEM 1 x 370 MW YELAHANKA TPS	SPECIFICATION NO. PE-TS-409-154-A001
		VOLUME NO. : II-B
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		REV NO. 00 : DATE : 19.01.16
		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. 3.3 Signed & stamped Copy of Electrical load data (Annexure-VIII). 4.0 List of enclosures : a) Electrical scope between BHEL & vendor b) Standard BHEL specification for motors. c) Datasheets(A&C) & quality plan for motors. d) Electrical Load data (Annexure-VIII). e) BHEL cable listing format	

PACKAGE : CHEMICAL DOSING SYSTEM
SCOPE OF VENDOR: SUPPLY

PROJECT :

<u>S.NO</u>	<u>DETAILS</u>	<u>SCOPE SUPPLY</u>	<u>SCOPE E&C</u>	<u>REMARKS</u>
1	415V MCC	BHEL	BHEL	240 V AC (supply feeder)/415 V, 3 phase, 4 wire AC supply shall be provided by BHEL. based on the load data provided by the vendor at contract stage for all equipment supplied by the vendor as part of contract. Any other voltage level (AC/DC) required will be derived by the vendor.
2	Local control panel	Vendor	Vendor*	Refer C & I specification for details
3	Local push buttons	Vendor	Vendor*	
4	Power cables, ordinary control cables and screened control cables	Vendor	Vendor*	Within the skid. If starters are in MCC, then outside skid, cables scope shall be as per note no. 1.
5	Junction box for control & instrumentation cable (if applicable)	Vendor	Vendor*	
6	Any special type of cable like compensating, co-axial, prefab, MICC & fibre optical	Vendor	Vendor*	Within the skid
7	Equipment grounding	Vendor	Vendor*	Within the skid. All equipment metallic enclosures / frames, metal structure etc. shall be grounded at two points each to the nearest grounding points / risers provided by BHEL.
8	Motors with base frame and fixing hardware for motors.	Vendor	Vendor*	Makes shall be subject to customer/ BHEL approval at contract stage.

**PACKAGE : CHEMICAL DOSING SYSTEM
SCOPE OF VENDOR: SUPPLY**

9	Cable glands ,lugs and bimetallic strip for equipment supplied by Vendor	Vendor	Vendor*	1. Double compression Ni-Cr plated brass cable glands 2. Solder less crimping type heavy duty tinned copper lugs for power and control cables.
10	Below grade grounding	BHEL	BHEL	
11	a) Input cable schedules (C & I) 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.
12	Electrical Equipment GA drawing & skid GA drawing	Vendor	-	For necessary interface review.

NOTES :- 1. If motor starters are provided in main MCC then BHEL will provide power & control cable including supply, laying & termination.
2. All QPs shall be subject to approval of BHEL/customer after award of contract without any commercial implication.

*E & C by vendor during factory assembling of the skid.



TITLE

LV MOTORS

DATA SHEET-A

1 X 370 MW YELAHANKA TPP

SPECIFICATION NO.

VOLUME

II B

SECTION

D

REV NO.

00

DATE

19.01.2016

SHEET

1

OF

1

- 1.0 Design ambient temperature : 50 °C
- 2.0 Maximum acceptable kW rating of LV motor : 200 KW
- 3.0 Installation (Indoors/ Outdoors) : As required
- 4.0 Details of supply system
 - a) Rated voltage (with variation) : 415V $\pm$ 10%
 - b) Rated frequency (with variation) : 50 Hz + 3 % to - 5%
 - c) Combined voltage & freq. variation : 10% (sum of absolute values)
 - d) System fault level at rated voltage : 50 kA for 1 sec
 - e) Short time rating for terminal boxes
 - o 100 kW and above (Breaker : 50 KA for 0.2 sec. Controlled)
 - o Below 100 kW (Contactor : 50 KA protected by fuse Controlled)
 - f) LV System grounding : Solidly
- 5.0 Class of insulation : Class 'F', with temp rise limited to class B.
- 6.0 Minimum voltage for starting : (a) 85% of rated voltage
(As percentage of rated voltage)
- 7.0 Power cables data : Shall be given during detailed engg.
- 8.0 Earth Conductor Size & Material : Shall be given during detailed engg
- 9.0 Space heater supply : 240 V, 1 ϕ , 50 Hz
- 10.0 Rating up to which Single phase motor : Acceptable below 0.20 kW
- 11.0 Locked rotor current
 - a) Limit as percentage of FLC : As per IS 12615*
- 12.0 Flame-proof motor
 - a) Enclosure suitable (As per IS: 2148) : As per requirement
 - b) Classification of Hazardous area : As per requirement
(As per IS: 5572 part-I)
- 13.0 Paint shade : Shall be given during detailed engg.
- 14.0 Degree Of protection for motor : IP 54 for indoor as per IS 4691
IP 55 for semi indoor/outdoor as per IS 4691
- Degree Of protection for terminal box : IP 55 as per IS 4691

15.0 * Continuous duty LT motors up to 200 KW Output rating (at 50 deg.C ambient temperature), shall be Premium efficiency (IE3) as per IEC: 60034-30/ IS: 12615



TITLE

LV MOTORS**DATA SHEET-A****1 X 370 MW YELAHANKA TPP**

SPECIFICATION NO.

VOLUME II B

SECTION D

REV NO. 00 DATE 19.01.2016

SHEET 1 OF 1

16.0 TESTING**16.1 Type Tests**

For LT Motors above 55kW, type test reports for type tests as per IS: 325/ IS: 12615 conducted on equipment similar to those proposed to be supplied 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.

16.2 Routine Tests

All motors shall be subjected to routine tests as per IS: 325/ IS: 12615 in the presence of customer or customer representative.

	TITLE	MOTOR DATA SHEET – C 1 x 370 MW YELAHANKA CCPP	SPECIFICATION NO.	
			VOLUME	II B
			SECTION D	
			REV NO. 00 DATE	
			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			

	TITLE	MOTOR DATA SHEET – C 1 x 370 MW YELAHANKA CCPP	SPECIFICATION NO.	
			VOLUME	II B
			SECTION D	
			REV NO. 00	DATE
			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			

CUSTOMER :			PROJECT		SPECIFICATION :							
			TITLE		NUMBER :							
BIDDER/ : VENDOR			QUALITY PLAN NUMBER PED-506-00-Q-006, REV-01		SPECIFICATION TITLE							
SHEET 1 OF 2			SYSTEM		ITEM AC ELECT. MOTORS BELOW 55KW (LV)							
SL. NO.	COMPONENT/OPERATION	CHARACTERISTICS CHECK	CAT.	TYPE/ METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORM	FORMAT OF RECORD	AGENCY	SECTION	VOLUME III	REMARKS
1	2	3	4	5	6	7	8	9	P	W	V	
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	MANUF'R'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									

		QUALITY PLAN		CUSTOMER : BIDDER/ : VENDOR : SYSTEM :		PROJECT TITLE QUALITY PLAN NUMBER PED-506-00-Q-006, REV-01 ITEM AC ELECT. MOTORS BELOW 55KW (LV)		SPECIFICATION : NUMBER : SPECIFICATION : TITLE :			
										SHEET 2 OF 2	
										COMPONENT/OPERATION	
										CHARACTERISTICS CHECK	
SL. NO.	2	3	4	5	6	7	8	9	10	11	
1		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							
		NAME									
		SIGNATURE									
		DATE				BIDDER'S/VENDORS COMPANY SEAL					

QUALITY PLAN			CUSTOMER :		PROJECT TITLE		SPECIFICATION : NUMBER :							
SHEET 1 OF 9			BIDDER/ VENDOR		QUALITY PLAN NUMBER PED-506-00-Q-007, REV-03		SPECIFICATION : TITLE							
SL. NO.	COMPONENT/OPERATION	CHARACTERISTIC CHECK	SYSTEM	CAT.	TYPE/ METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORM	FORMAT OF RECORD	SECTION			VOLUME III	REMARKS
										AGENCY	P	W		
1	2	3	4	5	6	7	8	9	10	11				
1.0	RAW MATERIAL & BOUGHT OUT CONTROL													
1.1	SHEET STEEL, PLATES, SECTION, EYEBOLTS	1.SURFACE CONDITION	MA	VISUAL	100%	-	FREE FROM BLINKS, CRACKS, WAVINESS ETC	LOG BOOK	3	-	-			
		2.DIMENSIONS	MA	MEASUREMENT	SAMPLE	MANFR'S DRG./SPEC	MANFR'S DRG./SPEC	-DO-	3	-	-			
		3.PROOF LOAD TEST (EYE BOLT)	MA	MECH. TEST	-DO-	-DO-	INSPEC. REPORT		3	-	2			
1.2	HARDWARES	1.SURFACE CONDITION	MA	VISUAL	100%		FREE FROM CRACKS, UN-EVENNESS ETC.	-DO-	3	-	-			
		2.PROPERTY CLASS	MA	VISUAL	SAMPLES	MANFR'S DRG./SPEC BOOK	RELEVANT IS/SPEC.	SUPPLIERS TC & LOG	3	-	2	PROPERTY CLASS MARKING SHALL BE CHECKED BY THE VENDOR		
1.3	CASTING	1.SURFACE CONDITION	MA	VISUAL	100%		FREE FROM CRACKS, BLOW HOLES ETC.	LOG BOOK	3	-	2			
		2.CHEM. & PHY. PROP.	MA	CHEM & MECH TEST	1/HEAT NO.	MANFR'S DRG./SPEC	RELEVANT IS/	SUPPLIER'S TC	3	-	2	HEAT NO. SHALL BE VERIFIED		
1.4	PAINT & VARNISH	3.DIMENSIONS	MA	MEASUREMENT	100%	MANUFR'S DRG.	MANUFR'S DRG.	LOG BOOK	3	-	2			
		1.MAKE SHADE, SHELF LIFE & TYPE	MA	VISUAL	100% CONTINUOUS	MANFR'S DRG./SPEC	MANFR'S DRG./SPEC	LOG BOOK	3	-	2			
BHEL			PARTICULARS		BIDDER/VENDOR									
			NAME											
			SIGNATURE											
			DATE											
			BIDDERS/VENDORS COMPANY SEAL											

		QUALITY PLAN		CUSTOMER :		PROJECT TITLE		SPECIFICATION : NUMBER :					
SHEET 2 OF 9		BIDDER/ VENDOR :		QUALITY PLAN		TITLE		SPECIFICATION :					
		SYSTEM		NUMBER PED-506-00-Q-007, REV-03		TITLE		SECTION					
SL. NO.	COMPONENT/OPERATION	CHARACTERISTIC CHECK	CAT.	TYPE/ METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORM	FORMAT OF RECORD	AGENCY	REMARKS			
1	2	3	4	5	6	7	8	9	P	W	V		
1.5	SHAFT (FORGED OR ROLLED)	1. SURFACE COND.	MA	VISUAL	100%	-	FREE FROM VISUAL DEFECTS	-DO-	3	-	-	VENDOR'S APPROVAL IDENTIFICATION SHALL BE MAINTAINED	
		2. CHEM. & PHYSICAL PROPERTIES	MA	CHEM. & PHYSICAL TESTS	1/HEAT NO. OR HEAT TREATMENT BATCH NO	MFG. DRG. SPEC.	RELEVANT IS	SUPPLIER'S TC	3	-	2		
		3. DIMENSIONS	MA	MEASUREMENT	100%	-DO-	-DO-	MANUF'R'S DRG.	LOG BOOK	3	-		2
		4.INTERNAL FLAWS	CR	UT	-DO-	ASTM-A388	MANUF'R'S SPEC. BHEL SPEC.	-DO-	-DO-	3	2		1
1.6	SPACE HEATERS, CONNECTORS, TERMINAL BLOCKS, CABLES, CABLE LUGS, CARBON BRUSH TEMP. DETECTORS, RTD, BTD'S	1. MAKE & RATING	MA	VISUAL	-DO-	MANUF'R'S DRG. SPEC.	MANUF'R'S DRG. SPEC.	-DO-	3	-	2		
		2. PHYSICAL COND.	MA	-DO-	-DO-	-	NO PHYS. DAMAGE, NO ELECTRICAL DISCONTINUITY	-DO-	3	-	2		
		3.DIMENSIONS (WHEREVER APPLICABLE)	MA	MEASUREMENT	SAMPLE	MANUF'R'S DRG./ SPEC.	MANUF'R'S DRG. / SPEC.	-DO-	3	-	2		
		4.PERFORMANCE/ CALIBRATION	MA	TEST	100%	-DO-	-DO-	INSP. REPORT	3	-	2		
BHEL		PARTICULARS		BIDDER/VENDOR									
		NAME											
		SIGNATURE											
		DATE											
												BIDDER'S/VENDORS COMPANY SEAL	

			CUSTOMER :		PROJECT		SPECIFICATION :	
QUALITY PLAN			BIDDER/ VENDOR		TITLE		NUMBER :	
SHEET 3 OF 9			SYSTEM		QUALITY PLAN		TITLE	
CHARACTERISTIC CHECK			CAT.		ITEM: AC ELECT. MOTORS 55 KW & ABOVE (LV & MV)		SECTION	
COMPONENT/OPERATION			TYPE/ METHOD OF CHECK		REFERENCE DOCUMENT		AGENCY	
			EXTENT OF CHECK		ACCEPTANCE NORM		VOLUME III	
					FORMAT OF RECORD		REMARKS	
							P	
							W	
							V	

SPECIFICATION :			PROJECT		CUSTOMER :		QUALITY PLAN		SPECIFICATION :													
NUMBER :			TITLE		BIDDER/ VENDOR		NUMBER PED-506-00-Q-007, REV-03		NUMBER :													
TITLE			ITEM: AC ELECT. MOTORS 55 KW & ABOVE (LV & MV)		SYSTEM		REFERENCE DOCUMENT		SECTION													
VOLUME III			FORMAT OF RECORD		CAT.		EXTENT OF CHECK		AGENCY													
REMARKS			P		TYPE/ METHOD OF CHECK		CHECK		P W V													
1			2		3		4		5		6		7		8		9		10		11	
2.0	IN PROCESS																					
2.1	STATOR FRAME WELDING (IN CASE OF FABRICATED STATOR)	1.WORKMANSHIP & CLEANNES	MA		VISUAL	100%	-DO-	GOOD FINISH	LOG BOOK	3/2	2	-										
		2.DIMENSIONS	MA		MEASUREMENT	-DO-	MANUF'S DRG	MANUF'S DRG	-DO-	2	-	-										
2.2	MACHINING	1.FINISH	MA		VISUAL	100%	-DO-	GOOD FINISH	LOG BOOK	2	-	-										
		2.DIMENSIONS	MA		MEASUREMENT	-DO-	MANUF'S DRG	MANUF'S DRG	-DO-	2	-	-										
		3.SHAFT SURFACE FLOWS	MA		PT	-DO-	RELEVANT SPEC./ ASTM-E165	MANUF'S SPEC./ BHEL SPEC./	-DO-	2	-	1										
2.3	PAINTING	1.SURFACE PREPARATION	MA		VISUAL	100%	MANFR'S SPEC./BHEL SPEC./ SAME AS RELEVANT STAND	BHEL SPEC. SAME AS COL.7	LOG BOOK	2	-	-										
		2.PAINT THICKNESS (BOTH PRIMER & FINISH COAT)	MA		MEASUREMENT BY ELCOMETER	SAMPLE	-DO-	-DO-	-DO-	2	-	-										
		3.SHADE	MA		VISUAL	-DO-	-DO-	-DO-	Log Book	2	-	-										
		4.ADHESION	MA		CROSS CUTTING & TAPE TEST	-DO-	-DO-	-DO-	Log Book	2	-	-										
BHEL			PARTICULARS		BIDDER/VENDOR																	
			NAME																			
			SIGNATURE																			
			DATE																			
																					BIDDER'S/VENDORS COMPANY SEAL	

		CUSTOMER :		PROJECT TITLE		SPECIFICATION : NUMBER :		SPECIFICATION : NUMBER :		
QUALITY PLAN		BIDDER/ VENDOR		QUALITY PLAN		SPECIFICATION : TITLE		SPECIFICATION : TITLE		
SHEET 6 OF 9										
SL. NO.	COMPONENT/OPERATION	CHARACTERISTIC CHECK	SYSTEM CAT.	TYPE/ METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORM	FORMAT OF RECORD	SECTION AGENCY	VOLUME III REMARKS
									P W V	
1	2	3	4	5	6	7	8	9	10	11
2.4	SHEET STACKING	1.COMPLETENESS	MA	MEASUREMENT	SAMPLE	MANUF'R'S SPEC.	MANUF'R'S SPEC.	Log Book	2 -	-
		2.COMPRESSION & TIGHTENING	MA	MEASUREMENT	100%	-DO-	-DO-	Log Book	2 -	-
		3.CORE LOSS & HOTSPOT	MA	ELECT.TEST	-DO-	-DO-	-DO-	Log Book	2 1*	1 (FOR MOTORS OF 2MW AND ABOVE) * ON 10% RANDOM SAMPLE
2.5	WINDING	1.COMPLETENESS	CR	VISUAL	100%	MANUF'R'S SPEC./BHEL SPEC.	MANUF'R'S SPEC./BHEL SPEC.	Log Book	2 -	-
		2.CLEANLINESS	CR	-DO-	-DO-	-DO-	-DO-	Log Book	2 -	-
		3.IR-HV-IR	CR	ELECT. TEST	-DO-	-DO-	-DO-	Log Book	2 -	1
		4.RESISTANCE	CR	-DO-	-DO-	-DO-	-DO-	Log Book	2 -	1
		5.INTERTURN INSULATION	CR	-DO-	-DO-	-DO-	-DO-	Log Book	2 -	-
		6.SURGE WITH STAND AND TAN. DELTA TEST	CR	-DO-	-DO-	-DO-	-DO-	Log Book	2 -	1 FOR MV MOTOR
2.6	IMPREGNATION	1.VISCOSITY	MA	PHY. TEST	AT STARTING	-DO-	-DO-	Log Book	2 -	-
		2.TEMP. PRESSURE VACUUM	MA	PROCESS CHECK	CONTINUOUS	-DO-	-DO-	Log Book	2 -	-
		3.NO. OF DIPS	MA	-DO-	-DO-	-DO-	-DO-	Log Book	2 -	1 THREE DIPS TO BE GIVEN
BHEL		PARTICULARS		BIDDER/VENDOR						
		NAME								
		SIGNATURE								
		DATE								
				BIDDER'S/VENDORS COMPANY SEAL						

				CUSTOMER :			PROJECT TITLE		SPECIFICATION : NUMBER :			
QUALITY PLAN				BIDDER/ VENDOR :		QUALITY PLAN		SPECIFICATION : TITLE				
SHEET 7 OF 9				SYSTEM		NUMBER PED-506-00-Q-007, REV-03		VOLUME III				
SL. NO.	COMPONENT/OPERATION	CHARACTERISTIC CHECK	CAT.	TYPE/ METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORM	FORMAT OF RECORD	SECTION		REMARKS	
									AGENCY			
									P	W	V	
1	2	3	4	5	6	7	8	9	10			11
2.7	COMPLETE STATOR ASSEMBLY	4.DURATION	MA	-DO-	-DO-	-DO-	-DO-	Log Book	2	-	1	
		1.COMPACTNESS & CLEANLINESS	MA	VISUAL	100%	-DO-	-DO-	Log Book	2	-	-	
2.8	BRAZING/COMPRESSION JOINT	1.COMPLETENESS	CR	-DO-	-DO-	-DO-	-DO-	Log Book	2	-	-	
		2.SOUNDNESS	CR	MALLET TEST & UT	-DO-	-DO-	-DO-	Log Book	2	-	1	
2.9	COMPLETE ROTOR ASSEMBLY	3.HV	MA	ELECT. TEST	-DO-	-DO-	-DO-	Log Book	2	-	1	VERIFICATION FOR MV MOTOR ONLY
		1.RESIDUAL UNBALANCE	CR	DYN. BALANCE	-DO-	MFG SPEC./ ISO 1940	MFG. DWG.	Log Book	2	-	1	
2.10	ASSEMBLY	2.SOUNDNESS OF DIE CASTING	CR	ELECT. (GROWLER TEST)	-DO-	MFG. SPEC.	MFG. SPEC.	Log Book	2	-	1	
		1.ALIGNMENT	MA	MEAS.	-DO-	-DO-	-DO-	Log Book	2	-	-	
		2.WORKMANSHIP	MA	VISUAL	-DO-	-DO-	-DO-	Log Book	2	-	-	
		3.AXIAL PLAY	MA	MEAS.	-DO-	-DO-	-DO-	Log Book	2	-	1	
		4.DIMENSIONS	MA	-DO-	-DO-	MFG.DRG./ MFG SPEC.	MFG. DRG/ RELEVANT IS	Log Book	2	-	-	
		5.CORRECTNESS, COMPLETENESS TERMINATIONS/ MARKING/ COLOUR CODE	MA	VISUAL	100%	MFG SPEC. RELEVANT IS	MFG SPEC. RELEVANT IS	Log Book	2	-	-	
		6. RTD, BTD & SPACE HEATER MOUNTING.	MA	VISUAL	100%	MFG SPEC. RELEVANT IS	MFG SPEC. RELEVANT IS	Log Book	2	-	1	
BHEL				PARTICULARS		BIDDER/VENDOR						
				NAME								
				SIGNATURE								
				DATE								
										BIDDER'S/VENDORS COMPANY SEAL		

QUALITY PLAN			CUSTOMER :		PROJECT		SPECIFICATION :				
SHEET 8 OF 9			BIDDER/ VENDOR		TITLE		NUMBER :				
COMPONENT/OPERATION			SYSTEM		QUALITY PLAN		SPECIFICATION :				
CHARACTERISTIC CHECK			CAT.		ITEM: AC ELECT. MOTORS 55 KW & ABOVE (LV & MV)		TITLE				
SL. NO.	TESTS	CHARACTERISTIC CHECK	CAT.	TYPE/ METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORM	FORMAT OF RECORD	SECTION	REMARKS	
1	2	3	4	5	6	7	8	9	10	11	
3.0	TESTS	1.TYPE TESTS INCLUDING SPECIAL TESTS AS PER BHEL SPEC. 2.ROUTINE TESTS INCLUDING SPECIAL TEST AS PER BHEL SPEC. 3.VIBRATION & NOISE LEVEL 4.OVERALL DIMENSIONS AND ORIENTATION 5.DEGREE OF PROTECTION 6. MEASUREMENT OF RESISTANCE OF RTD & BTD 7. MEASUREMENT OF RESISTANCE, IR OF SPACE HEATER 8. NAMEPLATE DETAILS 9.EXPLOSION FLAME PROOF NESS (IF SPECIFIED) 10. PAINT SHADE, THICKNESS & FINISH	MA	ELECT.TEST	1/TYPE/SIZE	IS-325/ BHEL SPEC./ DATA SHEET	IS-325/ BHEL SPEC./ DATA SHEET	TEST REPORT	2	1* 1	* NOTE - 1
			MA	-DO-	100%	-DO-	-DO-	-DO-	2	1\$ 1	\$NOTE - 2
			MA	-DO-	100%	IS-12075 & IS-12065	IS-12075 & IS-12065	-DO-	2	1\$ 1	\$NOTE - 2
			MA	MEASUREMENT & VISUAL	100%	APPROVED DRG/DATA SHEET	APPROVED DRG/DATA SHEET & RELEVANT IS	INSPC. REPORT	2	1 -	
			MA	ELECT. & MECH. TEST	1/TYPE/ SIZE	RELEVANT IS	BHEL SPEC. AND DATA SHEET	TC	2	- 1	TC FROM AN INDEPENDENT LABORATORY, REFER NOTE-3
			MA	-DO-	100%	-DO-	-DO-	-DO-	2	1\$ 1	\$NOTE - 2
			MA	-DO-	100%	-DO-	-DO-	-DO-	2	1\$ 1	\$NOTE - 2
			MA	VISUAL	100%	IS-325 & DATA SHEET	IS-325 & DATA SHEET	INSPC. REPORT	2	1\$ 1	\$NOTE - 2
			MA	EXPLOSION FLAME PROOF TEST	1/TYPE	IS-3682 IS-8239 IS-8240	IS-3682 IS-8239 IS-8240	TC	2	- 1	TC FROM AN INDEPENDENT LABORATORY, REFER NOTE-3
			MA	VISUAL & MEASUREMENT BY ELKOMETER	SAMPLE	BHEL SPEC. & DATA SHEET	BHEL SPEC. & DATA SHEET	TC	2	1\$ 1	SAMPLING PLAN TO BE DECIDED BY INSPECTION AGENCY \$NOTE - 2
BHEL			PARTICULARS			BIDDER/VENDOR					
			NAME								
			SIGNATURE								
			DATE								
						BIDDER'S/VENDORS COMPANY SEAL					

		QUALITY PLAN		CUSTOMER :		PROJECT TITLE		SPECIFICATION : NUMBER :			
				BIDDER/ VENDOR SYSTEM		QUALITY PLAN NUMBER PED-506-00-Q-007, REV-03 ITEM: AC ELECT. MOTORS 55 KW & ABOVE (LV & MV)		SPECIFICATION : TITLE			
SL. NO.	COMPONENT/OPERATION	CHARACTERISTIC CHECK	SHEET 9 OF 9	CAT.	TYPE/ METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORM	FORMAT OF RECORD	SECTION AGENCY P W V	VOLUME III REMARKS
1	2	3	4	5	6	7	8	9	10	11	
NOTES: 1 DEPENDING UPON THE SIZE AND CRITICALLY, WITNESSING BY BHEL SHALL BE DECIDED. 2 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. 3 IN CASE TEST CERTIFICATES FOR THESE TESTS ON SIMILAR TYPE, SIZE AND DESIGN OF MOTOR FROM INDEPENDENT LABORATORY ARE AVAILABLE, THESE TEST MAY NOT BE REPEATED. 4 WHEREVER CUSTOMER IS INVOLVED IN INSPECTION, AGENCY (1) SHALL MEAN BHEL AND CUSTOMERS BOTH TOGETHER. <u>Legends for Inspection agency</u> 1. BHEL/CUSTOMER 2. VENDOR (MOTOR MANUFACTURER) 3. SUB-VENDOR (RAW MATERIAL/COMPONENTS SUPPLIER) P. PERFORM W. WITNESS V. VERIFY											
BHEL				PARTICULARS	BIDDER/VENDOR						
				NAME							
				SIGNATURE							
				DATE							
BIDDER'S/VENDORS COMPANY SEAL											



1 X 370 MW YELAHANKA COMBINED CYCLE POWER PLANT

BASIC TECHNICAL FEATURES FOR LT MOTOR

Doc. No.

PE-DC-409-565-E003

Rev. No.

01

Dated

06-05-2016

Page

1 of 6

1.0 This document covers the basic technical features of low tension (LT) squirrel cage induction AC motors employed for driving auxiliaries of BHEL-PEM scope packages in 1 X 370 MW YELAHANKA COMBINED CYCLE POWER PLANT.

2.0 CODES AND STANDARDS

All motors shall conform to the latest applicable standards as listed below;

IS: 325, IEC: 60034: Three phase induction motors:

IS: 996, IEC: 60034: Single phase AC motors:

IS: 3177, IEC: 60034: Crane duty motors:

IS 12615 or IEC: 60034-30: Energy Efficient motors with Efficiency class IE3

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 machines

IS: 12065 Permissible limits of noise level for rotating electrical machines

IS: 12075 Mechanical vibration of rotating electrical machines

3.0 DESIGN REQUIREMENTS

3.1 General Requirements

The design ambient temperature shall be 50 deg C.

3.2 Supply system and rated voltage of motors

KW rating	Supply system	Rated voltage of motor
Upto & including 200 kW	415 V	415 V

3.2.1 Supply voltage & variations shall be as follows:-

Voltage variation (+/-) 10%

Frequency variation (+) 3% to (-) 5%

Combined V & F variation 10% (sum of absolute values)

3.2.2 Motors shall be capable of running continuously at rated output for each of the conditions specified.

3.3 Motor Rating

Motor ratings shall be adequate to meet the requirements of the drive equipment. Motors shall be continuously rated at the design ambient temperature of 50 deg C. Motor ratings shall have at least a 15% margin over the continuous maximum demand of the driven equipment at duty point or 10% margin over the continuous maximum demand of the driven equipment under entire operating range, whichever is higher.



**1 X 370 MW YELAHANKA COMBINED
CYCLE POWER PLANT**

**BASIC TECHNICAL FEATURES FOR
LT MOTOR**

Doc. No.

PE-DC-409-565-E003

Rev. No.

01

Dated

06-05-2016

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3.4 Starting Requirements

3.4.1 Motor shall start smoothly and rapidly. 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.

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

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 of 85 (eighty five) percent rated voltage.

3.4.3 Continuous duty LT motors up to 200 KW Output rating (at 50 deg. C ambient temperature), shall be Premium efficiency (IE3) as per IEC: 60034-30/ IS: 12615 and the locked rotor current of motors shall as per IS 12615.

3.4.4 The following frequency of starts shall apply

- i) Three cold starts in succession with the motor being initially at a temperature not exceeding the ambient temperature.
- ii) Two hot starts in succession with the motor being initially at a temperature not exceeding the rated load temperature.
- iii) 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)

3.4.5 Locked motor withstand time of hot motors at 110% rated voltage shall be as follows:

- a) For motors with starting time upto 20 sec.
 - at least 3 sec. more than starting time.
- b) For motor with starting time above 20 secs but not exceeding 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. Wherever 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.



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3.5 Running Requirements

- 3.5.1 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.
- 3.5.2 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 1 secs. The pull-out torque of the motor shall be at least 205% of full load torque to meet this requirement.

3.6 Stress during bus Transfer

- 3.6.1 Motors shall withstand the voltage 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.
- 3.6.2 Motor windings shall be adequately braced to satisfactorily withstand the mech. Stresses during above condition.
- 3.6.3 Motors shall be capable of withstanding heavy in-rush transient current caused by bus transfer without damage.
- 3.6.4 Motor and driven eqpt. Shafts shall be adequately sized to satisfactorily withstand transient torque under above condition.

3.7 Noise level

Maximum noise level measured at distance of 1.0 metres from the outline of motor shall not exceed 85 db (A) in line with IS 12065.

3.8 Vibration

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 Degree of Protection

- 4.1.1 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. The degree of protection for terminal boxes shall be IP 55 as per IS 4691. Outdoor motors shall be installed under a suitable canopy.
- 4.1.2 The stator laminations shall made from suitable silicon steel/magnetic steel sheet varnished on both sides and pressed to form a rigid core.
- 4.1.3 The rotor shall be of rigid cage construction with die cast aluminium / copper alloy / copper bars firmly wedged in bar slots and brazed to the end rings. The rotor cage shall be designed to operate satisfactorily under respective starting and load duty cycle.



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4.2 Enclosure and Cooling

4.2.1 Motors shall generally have totally enclosed fan cooled (TEFC) enclosures, the method of cooling conforming to IC-0141 or IC-0151 of IS: 6362.

4.2.2 Motors shall not be provided with any electric or pneumatic operated external fan for cooling the motors.

4.2.3 Frames shall be designed to avoid collection of moisture and all enclosures shall be provided with facility for drainage at the lowest point.

4.2.4 Motor weighing 25 Kg. or more shall be provided with removable type eyebolt or other adequate provision of lifting.

4.3 Class of Insulation

Tropicalised insulation material of Class 'F' shall be used .The temperature rise 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.

4.4 Bearings

4.4.1 In general all LV motors, bearings can be either sealed life lubricated type or regreasable type as per manufacturer's standard. However horizontally mounted motors shall have grease lubricated ball/roller or sleeve bearings.

4.4.2 The vertical motors shall have a combined thrust and guide bearing on top and guide bearing at bottom. If the ball or roller bearings can take vertical thrust, thrust and guide bearing need not be provided.

4.4.3 After taking all motor driven eqpt. loads and thrust (if any) into account, the bearings shall be suitable for min. 20,000 working hours . Re-greasable bearings shall be provided with grease nipples and relief holes for on-line re-greasing and shall be suitable for 8000 working hours without changing of the grease.

4.4.4 The bearings of solidly coupled motors shall be of the same type as those of the driven equipment.

4.4.5 For motors upto 2 kW, double sealed type bearings shall be provided.

4.5 Terminals and Terminal Boxes

4.5.1 Motors of rating 100 kW & above shall be controlled by circuit breaker, motors below 100 kW shall be controlled by Switch Fuse-contactor. The terminal box ,terminal leads, winding tails and associated equipment of LT motors shall be designed for the fault current of 50 kA, 0.2 secs for motors 100 kW & above (Breaker controlled), for motors below 100 kW (Contactor controlled) shall be 50 KA protected by fuse.

4.5.2 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.

4.5.3 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



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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 V, W & U respectively.

4.5.4 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.

4.5.5 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.

4.5.6 Separate terminal boxes shall be provided for space heaters and temp. Indicators. If this is not possible in case of LT motors, the space heater terminals shall be adequately segregated from the main terminals in the main terminal box. Detachable gland plates with double compression tinned brass glands shall be provided in terminal boxes.

4.5.7 Phase terminal boxes shall be suitable for 360 degree of rotation in steps of 90 degree for LT motors.

4.5.8 Cable glands and cable lugs as per selected cable sizes shall be provided in line with cable erection philosophy. For single core cable termination, gland plates shall be of non-magnetic material.

4.6 Grounding

Two separate earthing terminals suitable for connecting G.I. or MS strip grounding conductor shall be provided on opposite sides of motor frame. Each terminal box shall have a grounding terminal.

4.7 General

4.7.1 Motors provided for similar drives shall be interchangeable. Suitable foundation bolts are to be supplied along with the motors. Motors shall be provided with eye bolts, or other means to facilitate safe lifting if the weight is 20Kgs.and above.
Necessary fitments and accessories shall be provided on motors in accordance with the latest Indian Electricity rules 1956.

4.7.2 An arrow block shall be screwed on the body of the motors on the non-driving end to indicate the direction of rotation of the motors.

4.7.3 Motors for hazardous areas shall be with flame-proof enclosures in accordance with IS 2148 / IEC 60079. Classification of Hazardous area shall be as per IS: 5572 part-I.

5.0 ACCESSORIES

5.1 SPACE HEATERS

All motors rated above 30 kW shall be provided with space heaters to maintain the motor internal air temperature above the dew point. Space heaters shall be suitable for a supply of 240V AC, single phase, 50 Hz.

The leads from space heaters of each motor shall be brought out to a separate terminal Box. Space heaters shall be mounted inside the motor in accessible places so that their removal and replacement is simple.



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6.0 NAME PLATE

Motors shall have stainless steel name plate with all particulars as per IS: 325. In addition bearing identification number and type of lubricant is to be indicated.

7.0 PAINTING

The paint shall be epoxy based. The colour of finish shall be as per IS: 5 for motors. Shade shall be decided during detailed engineering.

8.0 TESTING

8.1 Type Tests

For LT Motors above 55kW, type test reports for type tests as per IS: 325/ IS: 12615 conducted on equipment similar to those proposed to be supplied 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.

8.2 Routine Tests

All motors shall be subjected to routine tests as per IS: 325/ IS: 12615.

8.3 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.

LOAD TITLE	RATING (KW / A)		UNIT (U)/STN (S)	Nos.		VOLTAGE CODE*	FEEDER CODE**	EMER. LOAD (Y)	CONT.(C)/ INTT.(I)	STARTING TIME >5 SEC (Y)	LOCATION	BOARD NO.	CABLE		BLOCK CABLE DRG. No.	CONT ROL CODE	REMA RKS	LOAD No.	VERIFICATI ON FROM MOTOR DATASHEE T (Y/N)	KKS NO
	NAME PLATE	MAX. CONT. DEMAND (MCR)		RUNNING	STANDBY								SIZE CODE	Nos						
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
ANNEXURE-VIII																				
Local Starter cum Control Panel Consisting starters for all motors For Hydrazine Dosing Skid.		5.0	U	-	-	D	S		C		On skid									
Local Starter cum Control Panel Consisting starters for all motors For Ammonia Dosing Skid.		5.0	U	-	-	D	S		C		On skid									
Local Starter cum Control Panel Consisting starters for all motors For NaOH Dosing Skid.		3.0	U	-	-	D	S		C		On skid									
Local Starter cum Control Panel Consisting starters for all motors For Phosphate Dosing Skid.		7.5	U	-	-	D	S		C		On skid									
NOTES: 1. COLUMN 1 TO 12 & 18 SHALL BE FILLED BY THE REQUISITIONER (ORIGINATING AGENCY); REMAINING COLUMNS ARE TO BE FILLED UP BY PEM (ELECTRICAL)/ CUSTOMER 2. ABBREVIATIONS : * VOLTAGE CODE (7):- (ac) A=11 KV, B=6.6 KV, C=3.3 KV, D=415 V, E=240 V (1 PH), F=110 V (cc): G=220 V, H=110 V, J=48 V, K=+24V, L=-24 V : ** FEEDER CODE (8):- U=UNIDIRECTIONAL STARTER, B=BI-DIRECTIONAL STARTER, S=SUPPLY FEEDER, D=SUPPLY FEEDER (CONTACTER CONTROLLED)																				
	LOAD DATA (ELECTRICAL)	JOB NO.		409		ORIGINATING AGENCY				PEM (ELECTRICAL)										
		PROJECT TITLE		1X370MW YELAHANKA TPS				NAME				DATA FILLED UP ON								
		SYSTEM		CHEMICAL DOSING SYSTEM				SIGN.				DATA ENTERED ON								
		DEPTT. / SECTION		MAUX				SHEET 1 OF 1		REV. 00		DE'S SIGN. & DATE								

[illegible]



TITLE:
KARNATAKA POWER CORPORATION LIMITED
1x370 MW KPCL YELAHANKA CCPP
TECHNICAL SPECIFICATION FOR CHEMICAL DOSING SYSTEM

SPEC NO: PE-TS-409-154-A001

VOLUME: IIB

SECTION: C3

REV NO: 01

DATE:

SECTION – C3
SPECIFIC TECHNICAL REQUIREMENT –CONTROL & INSTRUMENTATION



TITLE:
KARNATAKA POWER CORPORATION LIMITED
1x370 MW KPCL YELAHANKA CCPP
TECHNICAL SPECIFICATION FOR CHEMICAL DOSING SYSTEM

SPEC NO: PE-TS-409-154-A001

VOLUME: IIB

SECTION: C3

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DATE:

Specific Technical Requirements (C&I):

- 1.0 Chemical Dosing System shall be operated from plant DCS (DCS-BHEL Scope of supply) through operator work stations located in CCR.
- 2.0 Bidder to provide local control panel for each dosing systems. This will have starter cum control panel & will act as interface between the DCS and the field devices for commands & feedbacks. Interposing Relay shall be a part of starter cum control panel. In addition, LCP shall have the provision of command (start/stop), Indications & feedback interface with plant DCS.
- 3.0 Bidder to supply all the instruments (PT, LT, DPG, LS and DPS etc.) required for the package along with necessary fittings, accessories and valve manifold etc. All instruments shall be provided with durable epoxy coating for housing and all exposed surfaces of the instruments.
- 4.0 The junction boxes/LIEs for termination of instruments are in bidder's scope.
- 5.0 240 V AC (supply feeder)/415 V, 3 phase, 4 wire AC supply shall be provided inline with Electrical scope split sheet (Refer Electrical portion of the specification). Any other voltage level (AC/DC) required will be in bidder's scope . Bidder to include necessary power distribution board in his scope and all necessary hardware/software for the same shall be in bidder's scope.
- 6.0 Power supply derived for Transmitters, contact interrogation, interposing relay and solenoid shall generally be ungrounded 24V D.C only.
- 7.0 The make/model of various instruments/items/systems shall be subject to approval of owner/purchaser during detailed engineering stage. No commercial/ time implication in this regard shall be acceptable. In case of any conflict or repetition of clauses in the specification, the more stringent requirements among them are to be complied with.
- 8.0 MOVs (Motorised Valves) shall be integral type , if applicable.
- 9.0 Mandatory spares has to be supplied by bidder.
- 10.0 The scope of cable shall be referred in Electrical scope split sheet in Electrical portion of the specification.
- 11.0 Bidder to provide erection hardware including junction boxes, canopies, structural steel as required.
- 12.0 Every panel-mounted instrument, requiring power supply, shall be provided with a pair of easily replaceable glass cartridge fuses of suitable rating. Every instrument shall be provided with a grounding terminal and shall be suitably connected to the panel grounding bus.



TITLE:
KARNATAKA POWER CORPORATION LIMITED
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- 13.0 Provision for separate Terminal block/wiring diagram for power and control blocks of control panel to be ensured.
- 14.0 The make of all the items shall be from Approved Sub-vendor list.
- 15.0 Editable & pdf copy of Drawings/Documents and data to be furnished after award of the contract:
- GA & wiring diagram of local panel.
 - Local control panel & instruments data sheet.
 - Any other document decided during detailed engineering.

Note:-

1. All equipment items shall be of latest design with proven track record.
2. The above given scope is indicative & minimum. Any item/ equipment not indicated above however required for the completeness of the system is to be supplied by bidder without any technical, commercial and delivery implication to BHEL.
3. Documents of C&I System shall be submitted to end user/owner for approval during detail engineering. Changes, if any, shall be accommodated by the bidder without any price/time implication.



Technical specification for
CONTROL & INSTRUMENTATION
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Technical specification for
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1. INSTRUMENT DATASHEET
2. JB SPECIFICATION
3. INSTRUMENTATION CHECKLIST
4. LCP SPECIFICATION & DATA SHEET
5. LCP QUALITY PLAN
6. APPLICABLE CABLE TYPES



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INSTRUMENTATION DATA SHEET

TECHNICAL SPECIFICATIONS FOR FIELD INSTRUMENTS AND EQUIPMENTS

- All instruments offered by the Vendor shall be from reputed experienced manufacturers of specified type and range of equipment, whose guaranteed and trouble free operation has been proven. Further, all instruments shall be of proven reliability, accuracy, and repeatability requiring a minimum of maintenance. They shall comply with the acceptable international standards and shall be subject to Customer's approval. All instrumentation equipment and accessories under this specification shall be furnished as per technical specifications.
- The Vendor shall furnish all Instrumentation/ Control equipment & accessories under this specification as per technical specification, ranges, makes & model as approved by the Customer during detailed engineering. The necessary rootvalves, impulse piping, drain cocks, gauge-zeroing cocks, valve manifolds and all the other accessories required for mounting/ erection of these instruments shall be furnished as applicable. Double root valves shall be provided for all pressure tapping where the pressure exceeds 40 Kg./sq.cm. Impulse pipes, tubes, fittings and air supply and signal piping / tubing shall be supplied for all the instruments as applicable.

Pressure Indicators:

Direct reading, pipe mounted Pressure gauges of aluminium casing with 150 mm inch phenolic dial (white dial with black numerals), 316 SS Bourdon tube, nylon movements and micrometer type adjustable pointer, accuracy of +0.5% of span including accessories like syphons for steam services, snubbers for pump discharge applications and chemical diaphragm for corrosive and oil services and name plate. Material of accessories will be SS. IP65 or equivalent degree of protection for enclosure. Over range protection will be 25% above maximum pressure. Armoured capillary of 15m shall be provided. Bourdon tube shall be drawn tube for pressure < 70bar (g) and bored tube for > 70 bar (g).

Pressure Transmitters:

Micro-processor based Smart Electronic Transmitters, rack mounted with accuracy of +0.1% of span, field zero and span adjustment, self diagnostics, temperature sensor for compensation. Power supply 24 V DC; output signal of 4-20 mA DC and digital signal with HART protocol. IP 65 or equivalent degree of protection. Aluminium housing with epoxy coating, 316 SS sensing element. Accessories like snubbers for pump discharge applications and chemical diaphragm with 15 m PVC covered SS armoured capillary for corrosive and oil services. Material for accessories will be SS.

Differential Pressure Indicators:

Direct reading type, pipe mounted, bellows or diaphragm operated differential pressure indicators; aluminium casing (epoxy coated) with 150 mm dial, 316 SS pressure element; accuracy of +0.5% of span including accessories like snubbers for pump discharge application, chemical diaphragm with 15 m PVC covered SS armoured capillary for each limb for corrosive and oil services and 3 way manifold. Material of accessories will be SS. IP 65 or equivalent degree of protection. Over range protection will be 50% above maximum pressure.



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Differential Pressure Switches:

Bellows or diaphragm operated non-indicating field mounted type; aluminium casing (epoxy coated); 316 SS pressure element nylon movement; accuracy of +1% of span with an adjustable contact including accessories like snubbers for pump discharge applications, chemical diaphragm with 15 m capillary for each limb for all corrosive and oil services and 3 way manifold. Material of accessories will be SS. Auto reset micro switch with tamper proof external adjustable set values with 2 SPDT contacts rated for 0.2 A at 220 V DC. IP 65 or equivalent degree of protection over range protection 50% above maximum pressure. Repeatability shall be +0.5% FSR.

Smart Electronic Transmitters for Measurement of Pressure, Differential Pressure(DP), Flow/Level(DP Type):

Micro-processor based indicating type (LCD display), rack mounted with accuracy of +/- 0.1% of span, Repeatability :+0.05% of FSR or better, Linearity :+0.1% of FSR or better. Hysteresis: +0.1% of FSR or better external zero and span adjustment, self diagnostics, temperature sensor for compensation. Power supply 24 V DC; output signal of 4- 20 mA DC. IP 65 or equivalent degree of protection with epoxy coating, 316 SS/ haste alloy/ other suitable sensing element. Accessories like snubbers for pump discharge applications and chemical diaphragm with 15 m PVC covered SS armoured capillary for corrosive and oil services, etc. Material for accessories will be SS. HART protocol output shall be available in each transmitter. In case it becomes necessary to use a DP transmitter for pressure measurement then a 3-valve manifold should be used in place of 2-valve manifold. LVDT type is not acceptable.

Wherever, the process fluids are corrosive, viscous, solid bearing or slurry type, diaphragm seals shall be provided. Parts below the diaphragm shall be removable for cleaning. The entire volume above the diaphragm shall be completely filled with an inert liquid suitable for the application.

Level Gauges:

Reflex / tubular type with automatic ball check valves, illuminator,pyrex / borosilicate glass, guard rods and Holders. Material of accessories will be SS.

Level switches :

The instrument shall be provided on all equipment where parameter abnormality / status to be communicated to the operator in the control room. All permissive, interlock and protection conditions governed by the safety operation of the equipment.The instrument shall be external cage type with SW connection with isolation facility for surface mounted tanks and top mounted with still pipe for all sumps. External magnetic float operated level switches for tanks and vessels and top mounted level switches for sumps and underground tanks. Micro switch with 2 SPDT contacts rated for 0.2A , 220 V DC.Material of float will be 316 SS and the material of accessories will be SS. IP 54 or equivalent degree of protection for enclosure.

1.22.00 ULTRASONIC LEVEL TRANSMITTER

- | | | |
|---------------------------------|---|---|
| 01. Principle of operation | : | Detection of reflected ultrasonic pulse |
| 02. Signal processing | : | Microprocessor Controlled Signal Processing |
| 03. Type | : | Smart |
| 04. Display | : | Large alpha-numeric back lit LCD/LED |
| 05. Calibration & configuration | : | Accessible from front of panel |
| 06. Diagnostic | : | On-line |
| 07. Status | : | For power, Hi / Lo / V. Hi / V. Lo-level indication, fault etc. |
| 08. Construction | : | Plug-on board |
| 09. Power supply | : | 240 V AC 50 Hz / 24V DC |
| 10. Signal Output | : | 4-20 mA DC (isolated) - 600 Ohm load with HART protocol. |
| 11. Hysteresis | : | Fully adjustable preferred |
| 12. Output contacts | : | 2SPDT Potential free changeover contacts @ 5A 230V AC. |
| 13. Accuracy & Repeatability | : | 0.25% of span or better |
| 14. Resolution | : | 0.1% of span |
| 15. Operating temp. | : | Transmitter-55 °C and Sensor – 80 °C |
| 16. MOC Sensor | : | SS 316 in general / PTFE, PP for corrosive application. |
| 17. Humidity | : | 1% to 95% non condensing. |
| 18. Enclosure | : | IP-65 powder coated die cast aluminium |
| 19. Cable connection | : | ½" NPT with cable gland |
| 20. Mounting | : | 2" flanged for sensor and Transmitter on panel / surface. |

21. Accessories : Cable gland, prefab cable, mounting accessories.

NOTE : Sensors and transmitter shall be separately mounted.



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VOLUME

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JUNCTION BOX SPECIFICATION

	TITLE: STANDARD TECHNICAL SPECIFICATION (CONTROL & INSTRUMENTATION)	SPECIFICATION NO. PES-145-070	
		VOLUME II B	
		SECTION D	
		REV. 00	DATE: 31.12.2008
		SHEET 2 OF 3	

JUNCTION BOXES (JB) METAL TYPE

01. The Junction box enclosures shall comprise of a case and cover/door constructed from cold rolled sheet steel of thickness 3 mm. The construction shall ensure adequate strength and rigidity. Junction boxes and pull boxes shall be hot dipped galvanized and confirm to meet IP 65 class as per IS : 2147 with providing all facilities as below .

02. The junction boxes shall also be meet the following minimum requirements :

a) Junction boxes shall be provided with lockable door on the front side. The locks of the junction boxes shall be(Industrial Type) identical and operable by one key . Top of the boxes shall be arranged to slope towards rear of the box. Junction box shall have gland plate of 3mm sheet at bottom for indoor mounted boxes with neoprene/synthetic gasket lining of 6mm thick including door lining also. Suitable industrial type hinges & MS handle shall be provided for opening of the boxes smoothly & able to take load of door without any trouble /hampering IP 65 protection class.

b) All the junction boxes shall be suitable for mounting on walls, columns, structures etc. The brackets, nuts, bolts, screws. Glands and lugs required for erection shall be included in Supplier's scope of supply.

c) M6 Ni plated brass earthing stud 3 nos (2 external & 1 inside the JB)shall be provided for each junction boxe.

d) Terminal blocks shall be of **Cage Clamp Terminal blocks of Wago/Phoenix Make suitable for 2.5 mm² cable shall be** properly arranged inside JB with end plate & end clamp in DIN rail mounted & marked up with TB nos from top to bottom to facilitate easy termination of the cables. Adequate space from left/right hand ,top/bottom side of wall of JB to TB end & in between TB's shall be min. **100mm** gap all around shall be provided.

e) 20 % Spare terminals shall be provided for each of the junction boxes distributed overall terminal blocks.

f) Construction details shall be as per enclosed drawing attached in page 03 of 03 of this technical requirements. The exact size and dimensions of junction boxes shall be as decided during detailed during detailed engineering stage keeping in view the nos of terminals required etc. The same shall be subject to approval during detailed engineering stage.

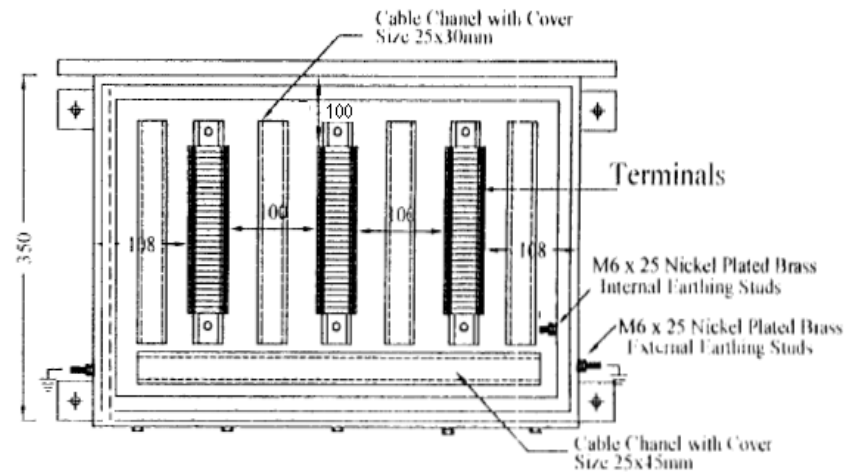
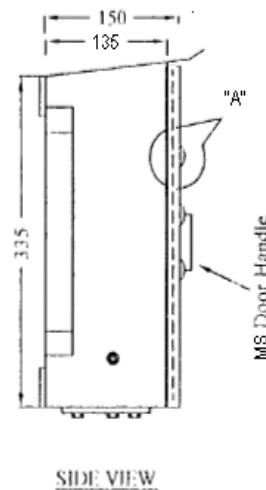
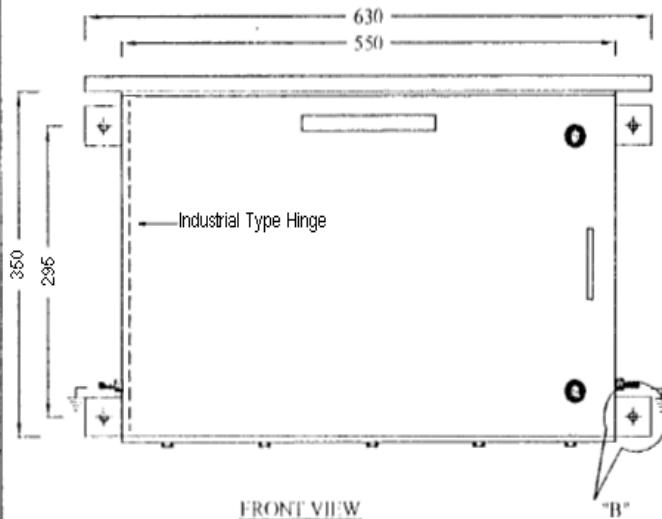
g) The Supplier shall furnish general arrangement, cross section details of junction boxes and the same shall be subject to BHEL/CUSTOMER's approval during detailed engineering stage.

h) The color of the Junction Boxes shall be Exterior Epoxy based to shade **Opaline Green to shade 275 of IS 5(Semi glossy)** , interior **brilliant white(Glossy)** & paint thickness shall be 100-150 micron.

03 **REMARKS**
Subsequent to order, bidder to furnish filled in BOM schematics / GA drgs etc.

04 **TESTING**
High voltage & Insulation Resistance test. & IP 65 (if not conducted earlier)

Typical Drg. for 72 Ways JB



NOTE :

All Dimensions are in mm.

1) Sheet Thk . 3.0mm CRCA

2) Protection IP65

3) Paint :

a) Hot Dip Galvanizing.

b) External:- Epoxy based to shade Opaline Green to shade 275 of IS 5 (Semi glossy)

Internal:- Brilliant white (Glossy)

4) Panels are Wall mounting type with smooth finish.

5) All doors are open through hinged with handle & lock arrangement.

6) All doors , gland plate & removables are to be gasketed.

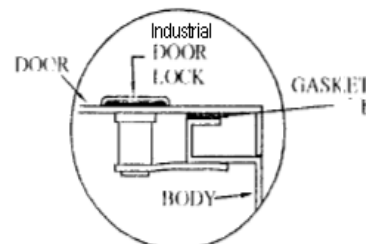
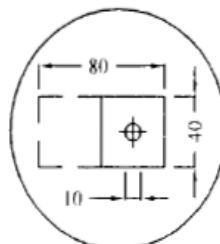
7) Fixing Bolts : 4 Set of zinc plated Fasteners each Set Consists of 1 No - M10 x 60mm Bolt , 1 No - Spring washer, 2 Nos Plain washer & 1 No - M10 nut.

8) Terminal blocks are be provided with number markers Continuously from top to Bottom

9) Paint thickness shall be 100-150 micron. 80-100 micron for Powder coating.

10) Door locks for all the boxes will have identical with a common key

11) Quantity - As per scope of supply.



BILL OF MATERIAL

Sl	Description	Make	Qty
1	2.5 Sq.mm Cage Clamp type With 6.6 Polyamide Terminal block	WAGO / Phenix	87 Nos.

01	Rev	Drw	Name	Date	Sign	Customer Project		Sheet No. - 01/01	Rev
		Ckd.				Title	GA FOR 72 WAY JUNCTION BOX	Scale - N.T.S.	01
		Appd.							



Technical specification for
CONTROL & INSTRUMENTATION
 1X370 MW YELAHANKA CCPP

SPEC NO.: **PE-TS-409-145-I**

VOLUME

SECTION

REV. NO.

00

DATE : 05.01.2016

SHEET

OF

Instrumentation Check list



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 correlation are not available manufacturer'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 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 :

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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 LEVEL 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 / DRWGS	P	W	V	
	TYPE						
	MODEL/ TAG NO.						
	DAIL SIZE						
	RANGE/SCALE						
	END CONNECTION						
2	DIMENSIONS, PROCESS CONNECTION	ONE / LOT		P	W	V	
3	ACCURACY			P	W	V	
4	MATERIAL TC FOR			P	V	V	
	BODY ISO.						
	VALVE						
	GAUGE GLASS						
5	HYD. TEST	SEE NOTE-1 BELOW		P	W	V	
6	ACCESSORIES AS APPLICABLE			P	W	V	

Legend :

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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.



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

CHECK LIST FOR ANALYTICAL INSTRUMENTS

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	V	V	
	VISUAL						
	MAKE, MODEL No.						
	POWER SUPPLY						
	TYPE						
2	DIMENSIONS CHECK			P	V	V	
3	FUNCTIONAL CHECK			P	V	V	
4	LEAKAGE TEST			P	V	V	
5	HV / IR TEST			P	V	V	
6	LINEARITY			P	V	V	
7	RESPONSE TIME			P	V	V	
8	ENCLOSURE CLASS			P	V	V	
9	ACCESSORIES, AS APPLICABLE			P	V	V	
10	ACCURACY / CALIBRATION			P	V	V	
11	ALARM CONTACT TEST			P	V	V	
12	ANALOG OUTPUT CHECK			P	V	V	
13	BURN-IN TEST OF ELECTRONIC PARTS	1/LOT		P	V	V	
14	IN-BUILT INDICATOR, ZERO, SPAN, RANGE SCALE SELECTION ETC	SEE NOTE-1 BELOW		P	V	V	

Legend :

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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.
- 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 FLOAT OPERATED LEVEL SWITCH

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	V	V	
	MODEL NO/TAG NO						
	TYPE						
	END CONNECTION						
2	ON/OFF DIFFL			P	W	V	
3	REPEATABILITY	SEE NOTE-5	---	P	W	V	
4	IR TEST			P	W	V	
5	HV TEST			P	V	V	
6	PR. TEST ON CHAMBER			P	V	V	
7	MATL. TC FOR CHAMBER & FLOAT	FOR LOT	---	V	V	V	
8	CONTACT CONFIG. & RATING FOR MICROSWITCH	FOR LOT	---	V	V	V	
9	TC FOR DEGREE OF PROTECTION	TYPE TEST	---	V	V	V	
10	MANUFACTURER TO ENSURE WELDING PROCEDURE, WELDERS & NDT AS PER ASME FOR PR >40 KG/CM2	SEE NOTE-1 BELOW	---	P	V	V	
11	CHECK FOR TEMP. SUITABILITY FOR MICROSWITCH AND LEAD WIRE		---	V	V	V	
12	ACCESSORIES AS APPLICABLE		APPROVED SPEC./ DATA SHEETS	V	V	V	

Legend :

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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
- IBR certificates shall be provided wherever required.
- Contractor to provide compliance certificate for tests/checks verified by contractor and 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 :

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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.



Technical specification for
CONTROL & INSTRUMENTATION
1X 370 MW YELAHANKA CCPP

SECTION D

REV. NO. 00

DATE : 04.05.2016

LCP SPECIFICATION & DATASHEET



SPECIFICATION FOR LOCAL PANELS

SPECIFICATION NO.: PE-SS -999- 145 -054A	
VOLUME	II B
SECTION	D
REV. NO. 03	DATE : 16-09-2013
SHEET	1 OF 6

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 Auxiliary Plant & Equipment.

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 & Pressurised 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 PANELS

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- 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



SPECIFICATION FOR LOCAL PANELS

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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.

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.



SPECIFICATION FOR LOCAL PANELS

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

4.2 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.



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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

4.3.2 Type Tests

1. Enclosure Class Test



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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 Shee 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 despatch, 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 |



DATA SHEET FOR LOCAL PANELS

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

VOLUME

SECTION

REV. NO.

DATE: 04.05.2016

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
(As per requirement EDN)

ENCLOSURE SHEET THICKNESS

FRONT

☒ 2.0 mm

OTHER

☒ 2.0 mm

DOOR

☒ 1.6 mm

HEIGHT

☒ 2365 mm for stand alone panels. ☐ Other

OTHER

☒ Load bearing sheet front shall have 3mm thickness

TECHNICAL

INPUT POWER SUPPLY *

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

☒ 415V 3 PHASE 4W / 240V AC
☐ 415V 3 PHASE 3W

NO. OF FEEDERS

☐ ONE ☒ TWO

STARTER WITH MCC

(CHECK WITH MAUX/ELEC)

☒ REQUIRED ☐ NOT REQUIRED

IPR POSITION

☒ MCC ☐ RELAY PANEL

CONTACT RATING OF RELAY

☒ 5 Amp, 230 V AC ☒ 0.25 Amp, 220V DC

CONTROL SUPPLY

☐ 110V AC ☒ 220V AC
☐ 220V DC ☐ Other.
(As per requirement)

ALARM ANNUNCIATOR WINDOW

(EXCLUDING SPARES)

20 NOS. (AS REQUIRED)

TEMP SCANNER

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

☐ REQUIRED ☒ NOT REQUIRED

PAINT TYPE

☐ EPOXY ENAMEL
☒ EPOXY POWDER COATED

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) .

FINISH (EXTERNAL)

☒ MATT
☐ GLOSSY ☐ SEMI GLOSSY

PANEL COLOUR (INTERNAL)

☐ WHITE ☐ CREAM
☒ OFF WHITE

FINISH (INTERNAL)

☒ MATT
☐ GLOSSY ☐ SEMI GLOSSY

CLASS OF PROTECTION

☒ IP-65 (FOR INDOOR SERVICE)
☒ IP-67 (FOR OUTDOOR SERVICE) ☐ ANY
OTHER

CONTROL HARDWARE

☒ Local START/ STOP along with status indications.

FOUNDATION ARRANGEMENT

☒ SKID MOUNTED



DATA SHEET FOR LOCAL PANELS

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

VOLUME

SECTION

REV. NO.

DATE: 04.05.2016

SHEET 2 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)

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
SCOPE OF SUPERVISION FOR
ERECTION & COMMISSIONING
☐ APPLICABLE ☒ NA

* TO BE CO-ORDINATED WITH PEM ELECTRICAL

PREPARED BY

CHECKED BY

APPROVED BY

NAME

AANCHAL CHOUDHARY

SACHIN SRIVASTAVA

MA MANSOORI

COMPANY SEAL

DESIGNATION

SR.ENGR

DY.MNGR

D. GM

NAME:

SIGNATURE

SIGNATURE:

DATE

16.09.2013

16.09.2013

16.09.2013

DATE:



DATA SHEET FOR LOCAL PANELS

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

VOLUME

SECTION

REV. NO.

02

DATE: 16.09.2013

SHEET

3

OF

3

TAG No. Qty.....

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

Data Sheet C

DATA SHEET-C FOR LOCAL PANEL
(TO BE FILLED BY CONTRACTOR AFTER AWARD OF CONTRACT)

GENERAL	MANUFACTURER			
	CONSTRUCTION		☐ FOLDED ☐ WELDED (As per requirement EDN)	
	ENCLOSURE SHEET THICKNESS	FRONT		
		OTHER		
		DOOR		
		HEIGHT		
	OTHER			
TECHNICAL	INPUT POWER SUPPLY			
	NO. OF FEEDERS			
	CONTACT RATING OF RELAY			
	TEMP SCANNER			
	CONTROL SUPPLY			
	ALARM ANNUNCIATOR WINDOW (EXCLUDING SPARES)			
	PAINT TYPE			
	PANEL COLOUR (EXTERNAL)			
	FINISH (EXTERNAL)			
	TYPE OF MIMIC MATERIAL OF MIMIC THICKNESS OF MIMIC			
	PANEL COLOUR (INTERNAL)			
	FINISH (INTERNAL)			
	CLASS OF PROTECTION			
	CONTROL HARDWARE			
	FOUNDATION ARRANGEMENT			
	WEIGHT OF PANEL (Kg.)			

	DATA SHEET FOR LOCAL PANELS			SPECIFICATION NO.: PE-SS-999-145-054A	
				VOLUME	
				SECTION	
				REV. NO. 02	DATE: 16.09.2013
				SHEET 3	OF 3
TAG No. Qty.....			Data Sheet No.: PES-145A-DS1-0		
Data Sheet C					
DATA SHEET-C FOR LOCAL PANEL (TO BE FILLED BY CONTRACTOR AFTER AWARD OF CONTRACT)					
	PANEL TYPE				
	CABLE GLAND				
	AMMETER (TYPE OF INPUT)				
	SCOPE OF SUPERVISION				
NAME SIGNATURE DATE	PREPARED BY	CHECKED BY	APPROVED BY	COMPANY SEAL NAME: SIGNATURE: DATE:	
	AANCHAL CHOUDHARY	SACHIN SRIVASTYAVA	MA MANSOORI		
	16.09.2013	16.09.2013	16.09.2013		



Technical specification for
CONTROL & INSTRUMENTATION
1X 370 MW YELAHANKA CCPP

SECTION D

REV. NO. 00

DATE : 04.05.2016

LCP Quality Plan

 STANDARD QUALITY PLAN FOR LOCAL CONTROL PANEL		STD QUALITY PLAN NO.: PE-QP-999-145-I056										
		VOLUME IIB										
		SECTION D										
		REV. NO. 01 DATE: 22-02-2008										
		SHEET 1 OF 7										
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	
1.0	INCOMING Sheet Steel (CRCA & HR)	1. Chemical Composition	MA	Chemical analysis	Sample	Relevant standard	Relevant standard	Test Certificate	3	---	2	
		2. Bend Test	CR	Mech. test	Sample	Relevant standard	Relevant standard	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	Relevant standard	Relevant standard	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%	Relevant standard	Relevant standard	Log Book	2	---	1	
3.0	Cables / Wires	1. Visual / Surface defects	MA	Visual	100%	BHEL Spec. and Relevant standard	BHEL Spec. and Relevant standard	Log Book	2	---	---	
		2. IR and HV	MA	Electrical	100%	BHEL Spec. and Relevant standard	BHEL Spec. and Relevant standard	Log Book	2	---	---	
LEGEND: * CR - Critical characteristics MA - Major characteristics MI - Minor characteristics												
\$ P - Agency Performing the Test. W - Agency Witnessing the Test. V - Agency Verifying the Test.												
1 - BHEL 2 - Vendor 3 - Sub-vendor												

STANDARD QUALITY PLAN FOR LOCAL CONTROL PANEL													STD QUALITY PLAN NO.: PE-QP-999-145-I056			
													VOLUME IIB			
													SECTION D			
													REV. NO. 01 DATE: 22-02-2008			
													SHEET 2 OF 7			
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					
		3. Conductor a) Resistance b) Size c) Sheet colour	MA MA MA	Electrical Measurement Visual	100% 100% 100%	BHEL Spec. and Relevant standard	BHEL Spec. and Relevant standard	Log Book	2	---	---					
		4. Type / Routine Test Certificates	MA	Verification	100%	BHEL Spec. and Relevant standard	BHEL Spec. and Relevant standard	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	---	---					
		2. Verification of Test Certificates	CR	Scrutiny of Type / Routine T.Cs.	100%	Relevant standard	Relevant standard	Log Book	2	---	---					
		3. Operation / Functional check	CR	Electrical	Sample+ 100%@	Relevant standard & Catalogue	Relevant standard & Catalogue	Log Book	2	---	---	+ for relay & contactors only				
		4. I.R.	MA	Electrical	100%	Relevant standard & Catalogue	Relevant standard & Catalogue	Log Book	2	---	---	@ for all components except relays & contactors.				
		5. H.V.	MA	Electrical	100%	Relevant standard & Catalogue	Relevant standard & Catalogue	Log Book	2	---	---					
		6. Calibration	MA	Electrical	100%	Relevant standard & Catalogue	Relevant standard & Catalogue	Log Book	2	---	1					
		7. Pick up / Drop off Voltage	MA	Electrical	100%	Relevant standard & Catalogue	Relevant standard & Catalogue	Log Book	2	---	---					
LEGEND: * CR - Critical characteristics MA - Major characteristics MI - Minor characteristics													1 - BHEL 2 - Vendor 3 - Sub-vendor			



STD QUALITY PLAN NO.: PE-QP-999-145-I056

VOLUME IIB

SECTION D

REV. NO. 01 DATE: 22-02-2008

SHEET 3 OF 7

STANDARD QUALITY PLAN
FOR
LOCAL CONTROL PANEL

Sl. No.	Component / operation	* Category	Type/Method of Check	Extent of Check	Reference documents	Acceptance Norms	Format of Records	Agency \$				Remarks
								P	W	V		
5.0	Misc. Components like Gaskets, Terminal Blocks etc.	MA	Visual	Sample	BHEL Spec. & Mfrs. Catalogue	BHEL Spec. & Mfrs. Catalogue	Log Book	2				
		MA	Visual	Sample	BHEL Spec. & Mfrs. Catalogue	BHEL Spec. & Mfrs. Catalogue	Log Book	2				
		MA	Electrical	Sample	BHEL Spec. & Mfrs. Catalogue	BHEL Spec. & Mfrs. Catalogue	Log Book	2				
6.0	IN PROCESS Blanking / Bending / Forming	MI	Measurement	100%	Approved Mfr. drgs.	Approved Mfr. drgs.	Log Book	2				
		MA	Visual	100%	Factory Standard	Factory Standard	Log Book	2				
7.0	Nibbling / Punching	MI	Measurement	100%	Approved Mfr. drgs.	Approved Mfr. drgs.	Log Book	2				
		MA	Visual	100%	Approved Mfr. drgs.	Approved Mfr. drgs.	Log Book	2				
8.0	ASSEMBLY Frame Assembly & Sheet fixing	MA	Measurement	100%	Approved drg. / Mfr. Standards	Approved drg. / Mfr. Standards	Log Book	2		2		
		MA	Measurement	100%	Approved drg. / Mfr. Standards	Approved drg. / Mfr. Standards	Log Book	2		2		
		MA	Visual	100%	Approved drg. / Mfr. Standards	Approved drg. / Mfr. Standards	Log Book	2		2		
		MA	Visual	100%	Approved drg. / Mfr. Standards	Approved drg. / Mfr. Standards	Log Book	2		2		

LEGEND: * CR - Critical characteristics

MA - Major characteristics

MI - Minor characteristics

\$ P - Agency Performing the Test.

W - Agency Witnessing the Test.

V - Agency Verifying the Test.

1 - BHEL

2 - Vendor

3 - Sub-vendor

STANDARD QUALITY PLAN FOR LOCAL CONTROL PANEL												STD QUALITY PLAN NO.: PE-QP-999-145-I056											
												VOLUME IIB											
												SECTION D											
												REV. NO. 01		DATE: 22-02-2008									
												SHEET 4		OF 7									
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												
9.0	Pre-treatment and Painting	1. Pretreatment Process	MA	Visual	100%	Factory Standard & Relevant standard	Factory Standard & Relevant standard	Log Book	2	--	1												
		2. Process parameters like bath temp. concentration etc.	MA	Measurement	Periodic	Factory Standard & Relevant standard	Factory Standard & Relevant standard	Log Book	2	--	1												
		3. Dipping / Removal Time	MA	Measurement	100%	Factory Standard & Relevant standard	Factory Standard & Relevant standard	Log Book	2	--	1												
		4. Surface quality after every dip	MA	Visual	100%	Factory Standard & Relevant standard	Factory Standard & Relevant standard	Log Book	2	--	1												
		5. Primer after phosphating	MA	Visual, Thickness	100%	Factory Standard & Relevant standard	Factory Standard & Relevant standard	Log Book	2	--	1												
		6. Putty Application & Rubbing after primer	MA	Visual	100%	Factory Standard & Relevant standard	Factory Standard & Relevant standard	Log Book	2	--	1												
		7. Paint first coat	MA	Visual, Thickness	100%	Factory Standard & Relevant standard	Factory Standard & Relevant standard	Log Book	2	--	1												
		8. Putty Application and Rubbing after first coat of paint	MA	Visual	100%	Factory Standard & Relevant standard	Factory Standard & Relevant standard	Log Book	2	--	1												
		9. Paint second coat	MA	Visual, Thickness, Scratch test Colour adhesion	100%	Factory Standard & Relevant standard	Factory Standard & Relevant standard	Log Book	2	--	1												
LEGEND: * CR - Critical characteristics MA - Major characteristics MI - Minor characteristics												\$ P - Agency Performing the Test. W - Agency Witnessing the Test. V - Agency Verifying the Test.											
												1 - BHEL 2 - Vendor 3 - Sub-vendor											

STANDARD QUALITY PLAN FOR LOCAL CONTROL PANEL												STD QUALITY PLAN NO.: PE-QP-999-145-I056							
												VOLUME		IIB					
												SECTION		D					
												REV. NO.		01		DATE: 22-02-2008			
												SHEET		5		OF 7			
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 2. Wiring Termination (Crimped Lugs) 3. Ferrule numbers 4. Colour of wiring 5. Size of Conductor	MA MA MA MA MA	Visual Visual Visual Visual Measurement	100% 100% 100% 100% 100%	Approved drgs. & Specs. Approved drgs. & Specs. Approved drgs. & Specs. Approved drgs. & Specs. Approved drgs. & Specs.	Approved drgs. & Specs. Approved drgs. & Specs. Approved drgs. & Specs. Approved drgs. & Specs. Approved drgs. & Specs.	Log Book Log Book Log Book Log Book Log Book	2 2 2 2 2	--- --- --- --- ---	--- --- --- 1 1								
11.	Component Mounting	1. Correct components 2. Fixing	MA MA	Visual Visual	100% 100%	Approved drgs., Specs. & BOM Approved drgs., Specs. & BOM	Approved drgs., Specs. & BOM Approved drgs., Specs. & BOM	Log Book Log Book	2 2	--- ---	--- ---	--- ---							
12.	FINAL Final Inspection	1. Workmanship 2. Component layout (neatness, accessibility & safety) Mounting / Proper fixing of all components 3. Components identification Marking / Name plates	MA MA MA	Visual Visual Visual	100% 100% 100%	Factory Standard BHEL approved drg. / Spec. BHEL approved drg. / Spec.	Factory Standard BHEL approved drg. / Spec. BHEL approved drg. / Spec.	Inspection Report Inspection Report Inspection Report	2 2 2	1 1 1	1 1 1	1 1 1	At Random by BHEL, based on 100 % internal test reports by Mfr.						
LEGEND: *												CR		- Critical characteristics		1		- BHEL	
												MA		- Major characteristics		2		- Vendor	
												MI		- Minor characteristics		3		- Sub-vendor	



STD QUALITY PLAN NO.: PE-QP-999-145-I056

VOLUME IIB

SECTION D

REV. NO. 01 DATE: 22-02-2008

SHEET 6 OF 7

STANDARD QUALITY PLAN
FOR
LOCAL CONTROL PANEL

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	
		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	

LEGEND: * CR - Critical characteristics

MA - Major characteristics

MI - Minor characteristics

\$

P - Agency Performing the Test.

W - Agency Witnessing the Test.

V - Agency Verifying the Test.

1 - BHEL

2 - Vendor

3 - Sub-vendor

STANDARD QUALITY PLAN FOR LOCAL CONTROL PANEL		STD QUALITY PLAN NO.: PE-QP-999-145-I056										
VOLUME IIB												
SECTION D												
REV. NO. 01		DATE: 22-02-2008										
SHEET 7		OF 7										
Sl. No.	Component / operation	Characteristics Checked	* Cate gory	Type/Method of Check	Extent of Check	Reference documents	Acceptance Norms	Format of Records	Agency \$			Remarks
									P	W	V	
13.	TYPE TEST	Degree of Protection	CR	Mech. Protection	Sample	BHEL approved spec., drg relevant IEC-60947, IEC-60079	BHEL approved spec., drg relevant IEC-60947, IEC-60079	Type Test Certificate	3	---	1	
14	ROUTINE TEST	IR before & after HV Test	CR	Electrical	100%	BHEL approved spec., drg., BOM & relevant standard	BHEL approved spec., drg., BOM & relevant standard	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 standard	BHEL approved spec/drg & relevant standard	Inspection Report	2	1	1	

LEGEND: * CR - Critical characteristics MA - Major characteristics MI - Minor characteristics										\$ P W V - Agency Performing the Test. - Agency Witnessing the Test. - Agency Verifying the Test.										1 - BHEL 2 - Vendor 3 - Sub-vendor										
---	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--



Technical specification for
CONTROL & INSTRUMENTATION
1X370 MW YELAHANKA CCPP

SPEC NO.: **PE-TS-409-145-I**

VOLUME

SECTION

REV. NO.

00

DATE : 25.04.2016

SHEET

OF

APPLICABLE CABLE TYPES

CABLE SIZES FOR 1X370 MW CCPP AT YELHANKA	
Sl no.	Cable Type
G-TYPE	
1	2P X 0.5 sqmm
2	4P X 0.5 sq mm
3	8P X 0.5 sqmm
F-TYPE	
1	4P X 0.5 sqmm
2	8P X 0.5 sqmm
3	12P X 0.5 sqmm
4	20P X 0.5 sqmm
CONTROL CABLE	
1	3C X 2.5 sqmm

**TITLE:**

KARNATAKA POWER CORPORATION LIMITED
1x370 MW KPCL YELAHANKA CCPP
TECHNICAL SPECIFICATION FOR CHEMICAL DOSING SYSTEM
(ANNEXURE-I)

SPEC NO: PE-TS-409-154-A001,R01

**LIST OF MAKES OF SUB-VENDOR ITEMS
(INDICATIVE)**



TITLE:

KARNATAKA POWER CORPORATION LIMITED
1x370 MW KPCL YELAHANKA CCPP
TECHNICAL SPECIFICATION FOR CHEMICAL DOSING SYSTEM
(ANNEXURE-I)

SPEC NO: PE-TS-409-154-A001,R01

SR. NO.	ITEM	SUPPLIERS	PLACE	REMARKS
1.	METERING PUMPS	VK PUMPS	NASIK	
		MILTON ROY INDIA	CHENNAI	
		SWELLORE	AHMEDABAD	
		POSITIVE METERING PUMPS	NASIK	
		METACHEM	MUMBAI	
2.	AGITATOR	REMI PEOCESS PLANT & M/C	MUMBAI	
		FIBRE & FIBRE	MUMBAI / SILVASA	
		CEECONS	CHENNAI	
		STANDARD ENGINEERS	MUMBAI	
3.	HORIZONTAL CENTRIFUGAL PUMPS	BEST AND CROMPTON ENGG LTD.	CHENNAI	
		BHARAT PUMPS & COMPRESSORS LTD	ALLAHABAD	
		FLOWMORE LTD.	GURGAON	
		FLOWSERVE INDIA CONTROLS PVT. LTD.	COIMBATORE	
		JYOTI LTD.	VADODARA	
		KIRLOSKAR BROTHERS LTD	PUNE	
		WILO MATHER & PLATT PUMPS PVT. LTD.	PUNE	
		V-FLO PUMPS & SYSTEMS CO. LTD.,	BEIJING-CHINA	
		WPIL LIMITED	KOLKATA	
4.	BALL VALVE (MANUAL /PNEUMATIC/ ELECTRIC) CLASS 150	HILLER	-	
		A.V. VALVES LTD	AGRA	
		AKAY INDUSTRIES PVT.LTD.	DHARWAD	
		BELGAUM AQUA VALVES PVT. LTD.	BELGAUN	
		ASIAN INDUSTRIAL VALVES & INSTRUMENTS.	CHENNAI	
		ATAM VALVES PVT. LTD.	JALANDHAR	
		DEMBLA VALVES LTD.	THANE	
		M/S GM ENGINEERING	RAJKOT	
		HAWA VALVES (INDIA) PVT. LTD.	NAVI MUMBAI	
		INTERVALVE (INDIA) LTD.	PUNE	
		LEADER VALVES LTD.	JALANDHAR	
		MICROFINISH VALVES PVT LTD.	HUBLI	
		NILON VALVES PRIVATE LIMITED	AHMEDABAD	
		SURYA VALVES AND INSTRUMENTS MFG CO.	CHENNAI	
		UNIFLOW	CHENNAI	
		VALTECH INDUSTRIES	MUMBAI	
		VAAS AUTOMATION PVT. LTD.	NEW DELHI	
		WEIR BDK VALVES- A UNIT OF WEIR INDIA PVT. LTD.	NEW DELHI	
5.	ELECTRIC MOTOR	CROMPTON GREAVES	AHMEDNAGAR	
		LAXMI HYDRAULICS PVT. LTD	BANGALORE / HUBLI*	
		RAJINDRA ELECT INDUSTRIES	FARIDABAD* / BANGALORE	
		GE-POWER		
		BHARAT BIJLEE	MUMBAI	
		SIEMENS	MUMBAI	
		NGEF	BANGALORE	



TITLE:

KARNATAKA POWER CORPORATION LIMITED
1x370 MW KPCL YELAHANKA CCPP
TECHNICAL SPECIFICATION FOR CHEMICAL DOSING SYSTEM
(ANNEXURE-I)

SPEC NO: PE-TS-409-154-A001,R01

SR. NO.	ITEM	SUPPLIERS	PLACE	REMARKS
6.	BUTTER-FLY VALVE	KIRLOSKAR ELECTRIC CO LTD.		
		ASEA BROWN BOVERI		
		MARATHON	KOLKATA	
		ADVANCE VALVES PVT. LTD.	NOIDA	
		FLUIDLINE VALVES COMPANY PVT.LTD.	GHAZIABAD	
		INSTRUMENTATION LTD.	PALAKKAD	
		INTERVALVE (INDIA) LTD.	PUNE	
		R AND D MULTIPLES (METAL CAST) PVT LTD	MUMBAI	
		SURYA VALVES AND INSTRUMENTS MFG CO.	CHENNAI	
		PENTAIR VALVES AND CONTROLS INDIA PRIVATE LIMITED	NAVI MUMBAI	
		UPADHAYA VALVES MANUFACTURERS PRIVATE LIMITED,	KOLKATA	
		VENUS PUMPS AND ENGG. WORKS	KOLKATA	
7.	DIAPHRAGM VALVE (MANUAL / PNEUMATIC) CLASS 150	WEIR BDK VALVES- A UNIT OF WEIR INDIA PVT. LTD.	NEW DELHI	
		WEIR BDK	HUBLI	
		CRANE FLOW PROCESS	SATARA	
		PROCON	MUMBAI	
		MAJESTIC VALVES (LABLINE)	-	
8.	DUAL PLATE CHECK VALVES	HAWA ENGINEERS	AHMEDABAD	
		ADVANCE VALVES PVT. LTD.	NOIDA	
		FLUIDLINE VALVES COMPANY PVT.LTD.	GHAZIABAD	1. DUAL PLATE CHECK VALVE CI - CLASS 150 & UP TO 600NB, 2. DUAL PLATE CHECK VALVE CCS - CLASS 150 & UP TO 500NB
		R AND D MULTIPLES (METAL CAST) PVT LTD	MUMBAI	
9.	Y-TYPE STRAINER / STRAINER (WATER SERVICE)	VENUS PUMPS AND ENGG. WORKS	KOLKATA	CI ,CCS & STAINLESS STEEL SPRING ASSISTED DUAL PLATE CHECK VALVES UPTO 700 NB AND 150 CLASS RATING.
		OTOKLIN GLOBAL BUSINESS LIMITED	MUMBAI	
		GRAND PRIX	NEW DELHI	
		JAYPEE	NEW DELHI	
		GREAVES COTTON	MUMBAI	
		MULTITEX FILTRATION ENGINEERS LIMITED,	NEW DELHI / NOIDA	
		FILTRATION ENGINEERS (I) PVT. LTD	MUMBAI	
		FLUIDNYE	-	
		SUNGOV ENGINEERING PVT. LTD.	DELHI	
		GRAND PRIX	FARIDABAD	
		JAYPEE INDUSTRIES PVT. LTD.	DELHI	
		BHATIA ENGINEERING CO.	DELHI	
10.	RUBBER FLAP TYPE CHECK VALVES	ASHVIK VALVES	-	
		FLOW WAY VALVES	-	
		BDK	-	
		MAJESTIC VALVES (LABLINE INST)	-	
		ADVANCE VALVES	-	
11.	SOLENOID VALVES	ROTEX	-	



TITLE:

KARNATAKA POWER CORPORATION LIMITED
1x370 MW KPCL YELAHANKA CCPP
TECHNICAL SPECIFICATION FOR CHEMICAL DOSING SYSTEM
(ANNEXURE-I)

SPEC NO: PE-TS-409-154-A001,R01

SR. NO.	ITEM	SUPPLIERS	PLACE	REMARKS
		AVCON	-	
12.	PRESSURE GAUGE/ DIFFERENTIAL PRESSURE GAUGE	A.N. INSTRUMENTS PVT. LTD.	KOLKATA	
		ASHCROFT INDIA PVT LTD.	GUJARAT	
		BOSE PANDA INSTRUMENTS PVT.LTD.	KOLKATA	
		FORBES MARSHALL (HYD) LTD.	HYDERABAD	
		GAUGE BOURDON INDIA PVT. LTD.	MUMBAI	
		H.GURU INDUSTRIES	KOLKATA	
		H.GURU INSTRUMENTS (SOUTH INDIA) P. LTD	BANGALORE	
		BAUMER TECHNOLOGIES INDIA PVT. LTD.	MUMBAI	
		TECHNO INDUSTRIES	AHMEDABAD	
13.	PRESSURE/DP/VACUUM SWITCH	INDFOSS	GHAZIABAD	
		SOR	USA	
		DRESSOR	USA	
		DELTA CONTROL	UK	
		TRAFAG	RANIPET	
		GIC(GAUGES BOURDON)	PANVEL	
		ASHCROFT INDIA PVT LTD.	USA/GERMANY	
		SWITZER	CHENNAI	
14.	TEMPERATURE GAUGE	A.N. INSTRUMENTS PVT. LTD.	KOLKATA	
		ASHCROFT INDIA PVT LTD.	GUJARAT	
		BUDENBERG GUAGE CO.LTD.	UK	
		FORBES MARSHALL (HYD) LTD.	HYDERABAD	
		GOA INSTRUMENTS INDUSTRIES PVT.LTD.,	GOA	
		GOA THERMOSTATIC INSTRUMENTS PVT.LTD.		
		GAUGE BOURDON INDIA PVT. LTD.	MUMBAI	
		H.GURU INDUSTRIES	KOLKATA	
		H.GURU INSTRUMENTS (SOUTH INDIA) P. LTD	BANGALORE	
		BAUMER TECHNOLOGIES INDIA PVT. LTD.	MUMBAI	
15.	LEVEL GAUGE (F&B, TUBULAR, REFLEX)	SBEM		
		CHEMTROL		
		PUNE TECHTROL		
		SIGMA		
		V AUTOMAT		
		GENERAL INSTRUMENTS		
16.	ROTAMETER	EUREKA INDUSTRIAL EQUIPMENTS PVT.LTD.	PUNE	
		FLOW STAR ENGINEERING PVT. LTD.,	FARIDABAD	
		FLOWTECH INSTRUMENTS SERVICRS	VADODARA	
		INSTRUMENTATION ENGINEERS PVT LTD	TELANGANA	
		SCIENTIFIC DEVICES (BOMBAY) PVT LTD,	NAVI MUMBAI	
17.	LEVEL SWITCH-CONDUCTIVITY TYPE	BLISS ANAND PVT. LTD.	GURGAON	
		FLOWTECH INSTRUMENTS SERVICRS	VADODARA	



TITLE:

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1x370 MW KPCL YELAHANKA CCPP
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(ANNEXURE-I)**

SPEC NO: PE-TS-409-154-A001,R01

SR. NO.	ITEM	SUPPLIERS	PLACE	REMARKS
		HI-TECH SYSTEMS & SERVICES LTD.	KOLKATA-	VENDOR SHALL SOURCE IMPORT CONTENTS OF LEVEL SWITCH (CONDUCTIVITY TYPE) FROM LEVELSTATE SYSTEMS LTD., UNITED KINGDOM.
		LEVCON INSTRUMENTS PVT. LTD.	KOLKATA	
		RAMAN INSTRUMENTS PVT.LTD.	MUMBAI	VENDOR SHALL SOURCE IMPORT CONTENTS OF LEVEL SWITCH (CONDUCTIVITY TYPE) FROM MOBREY MEASUREMENT, AN OPERATING UNIT OF MORBEY LTD., SLOUGH, BERKSHIRE, UNITED KINGDOM.
		SIGMA INSTRUMENTS CO.	MUMBAI	
		SOR INC.	USA	
		SAPCON INSTRUMENT PVT LTD.	INDORE	
		V. AUTOMAT & INSTRUMENTS (P) LTD.	NEW DELHI	
18.	LEVEL SWITCH (ALL TYPES)	LEVCON		
		CHEMTROLS SAMIL (INDIA) PVT LTD.		
		SWITZER		
		WAAREE (BAUMER INSTRUMENTS)		
		V AUTOMAT		
		PUNE TECHTROL		
19.	MAGNETIC FLOW METER	ABB	-	
		WAAREE (BAUMER INSTRUMENTS)	-	
		EUREKA	-	
		EMERSON	-	
		YOKOGAWA	-	
		HACH (POTENSE)	-	
		KROHNE MARSHALL	-	
20.	FLOW ELEMENT - NOZZLE	HYDROPNEUMATICS PVT. LTD.	GOA	
		INSTRUMENTATION LTD.	PALAKKAD	
		MICRO PRECISION PRODUCTS PVT. LTD.	FARIDABAD	
		MINCO (INDIA) FLOW ELEMENTS PVT. LTD.	GOA	
		STAR-MECH CONTROLS (I) PVT.LTD.	PUNE	
		SEIKO FLOW CONTROL GMBH	AUSTRIA	
21.	FLOW ELEMENT - ORIFICE	FLOW STAR ENGINEERING PVT. LTD.,	FARIDABAD	
		HYDROPNEUMATICS PVT. LTD.	GOA	
		INSTRUMENTATION LTD.	PALAKKAD	
		INSTRUMENTATION ENGINEERS PVT LTD	HYDERABAD	
		MICRO PRECISION PRODUCTS PVT. LTD.	FARIDABAD	
		MINCO (INDIA) PRIVATE LIMITED	GOA	
		STAR-MECH CONTROLS (I) PVT.LTD.	PUNE	
22.	FLOW TRANSMITTERS (ALL TYPES)	E & H	-	
		KHRONE MARSHALL	-	
		EMERSON	-	
		ABB	-	
		HONEYWELL	-	



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(ANNEXURE-I)

SPEC NO: PE-TS-409-154-A001,R01

SR. NO.	ITEM	SUPPLIERS	PLACE	REMARKS
		YOKOGAWA	-	
23.	LEVEL TRANSMITTERS (ALL TYPES)	EMERSON	-	
		E & H	-	
		ABB	-	
		HONEYWELL	-	
		V AUTOMAT	-	
		YOKOGAWA	-	
		SIEMENS	-	
		KROHNE MARSHALL	-	
24.	PRESSURE TRANSMITTERS (ALL TYPES)	EMERSON	USA/PAWANE	
		LAXONS AUTOMATION	DAMAN	
		YIL	BANGALORE	
		SIEMENS	THANE	
		FUJI	CHINA	
		YOKOGAWA	JAPAN	
		HONEYWELL	USA/PUNE	
25.	TEMPERATURE TRANSMITTERS	EMERSON	-	
		E & H	-	
		ABB	-	
		HONEYWELL	-	
		V AUTOMAT	-	
		YOKOGAWA	-	
		SIEMENS	-	
		FORBES MARSHALL	-	
26.	PH TRANSMITTERS	EMERSON	-	
		YOKOGAWA	-	
		HONEYWELL	-	
		ABB	-	
		HACH	-	
		FORBES MARSHALL	-	
27.	ANALYSERS (ALL TYPES)	ABB	-	
		EMERSON	-	
		YOKOGAWA	-	
		HONEYWELL	-	
		HACH POLYMETRON	-	
		SIEMENS	-	
		FORBES MARSHALL	-	
28.	PROGRAMMABLE LOGIC CONTROLLER	GE INTELLIGENT PLATFORMS PRIVATE LIMITED	BANGALORE	
		HONEYWELL AUTOMATION INDIA LIMITED ,	PUNE	
		ROCKWELL AUTOMATION INDIA LTD	SAHIBABAD	
		SIEMENS LIMITED	MUMBAI	
		SCHNEIDER ELECTRIC INDIA PVT.LTD.	NEW DELHI	
29.	UPS	HITACHI-HIREL	GANDHINAGAR	
		APC	BANGALORE	
		DELTA	GURGAON	



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SR. NO.	ITEM	SUPPLIERS	PLACE	REMARKS
		EMERSON	MUMBAI	
		DB POWER	PUNE	
		APLAB	MUMBAI	
30.	INSTRUMENT FITTINGS	AURA INCORPORATED	NEW DELHI	
		ASTEC VALVES & FITTINGS PVT. LTD.,	MUMBAI	
		ARYA CRAFTS & ENGINEERING PVT. LTD.	MUMBAI	
		COMFIT & VALVE PVT. LTD.	GUJARAT	
		FLUIDFIT ENGINEERS PVT. LTD.	MUMBAI	
		FLUID CONTROLS PVT. LTD.	MUMBAI	
		HP VALVES & FITTINGS INDIA PVT. LTD.	CHENNAI	
		PRECISION ENGINEERING INDUSTRIES	MUMBAI	
		PANAM ENGINEERS,	MUMBAI	
		PERFECT INSTRUMENTATION CONTROL (INDIA) PVT. LTD.	MUMBAI	
		VIKAS INDUSTRIAL PRODUCTS	NOIDA	
31.	JUNCTION BOX	AJMERA INDUSTRIAL & ENGINEERING WORKS	MUMBAI	
		FLEXPRO ELECTRICALS PVT. LTD.		METAL TYPE JUNCTION BOX ONLY
			GUJARAT	
		K.S.INSTRUMENTS PVT.LTD.	BANGALORE	
		SUCHITRA INDUSTRIES	BANGALORE	
		SHRENIK & COMPANY,	AHMEDABAD	
32.	CABLE GLAND	COMET	-	
		DOWELL	-	
		CHETNA	-	
		ELECTRO BILLETS	-	
		COMET	-	
		DOWELL	-	
		CHETNA	-	
34.	MS PLATES	SAIL		
		ESSAR STEEL		
		TISCO		
		RINL		
		JINDAL		
		LLOYD		
		ISPAT		
		INDIAN IRON & STEEL CO. LTD		
35.	SS PIPES / TUBES	APEX TUBES	BEHROR (ALWAR)	
		RATNAMANI	CHATTRAL	
		REMI	TARAPUR	
		PRAKASH STEELAGE	-	
36.	POWER/CONTROL/INSTRUMENT CABLE	CORDS CABLE	BHIWADI	
		RADIANT CABLES	HYDERABAD	
		POLYCAB	DAMAN	



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SPEC NO: PE-TS-409-154-A001,R01

SR. NO.	ITEM	SUPPLIERS	PLACE	REMARKS
		KEI	BHIWADI	
		NICCO	KOLKATA	
		RAVIN CABLES	PUNE	
		INCAB	PUNE	
		HVPL	FARIDABAD	
		TORRENT CABLE	NADIAD	
		HAVELLS	ALWAR	
		PARAMOUNT	KHUSHKHERA	
		SRI RAM CABLES	BHIWADI	
		THERMOCABLES	HYDERABAD	
		TORRENT CABLE	NADIAD	
		UNIVERSAL CABLES	SATNA	
		GEMSCAB	BHIWADI	
		DELTON	FARIDABAD	
37.	SAFETY SHOWER	UNICARE	-	
		MOHAN INDUSTRIES	-	
		SUPER SAFETY SERVICES	-	
		GLOBAL COMPOSITE	-	
		EPP	-	
		DEEPA COMPOSITE	-	
38.	FRP TANKS & FITTINGS	COROSEAL INDUSTRIES	-	
		CHEMICAL PROCESS & EQUIPMENT PVT LTD	-	
		J.R FIBRE INDUSTRIES PVT LTD	-	
		POLYPLAST	-	
39.	EJECTOR	ESSEM TECHNOLOGIES	-	
		RATNA PRASAD	-	
40.	LOCAL CONTROL PANEL	INDUSTRIAL SWITCHGEAR & CONTROL	-	
		POSITRONICS	-	
		DELTA CONTROL	-	
		L & T	-	
		GE POWER	-	
		PYROTECH	-	
		C& S	-	
		INDUSTRIAL SERVICE	KOLKATA	
		SUNRISE	BARODA	
41.	TANK (FRP)	GANDHI & ASSOCIATES	AHMEDABAD	
		MODERN EQUIPMENTS	CHENNAI	
		EAGLE PLAST	PUNE	
		OMEGA PLAST	MUMBAI	
		V K PUMPS	NASIK	
42.	STROKE CONTROLLER	METACHEM	MUMBAI	
		SWELORE	AHMEDABAD	
		MILTON ROY INDIA	CHENNAI	



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SPEC NO: PE-TS-409-154-A001,R01

SR. NO.	ITEM	SUPPLIERS	PLACE	REMARKS
43.	SAFETY VALVES/RELIEF VALVES	METACHEM	MUMBAI	
		KEYSTONE	BARODA	
		V K PUMPS	NASIK	
		MILTON ROY	CHENNAI	
44.	DUPLEX STRAINER	JAYPEE INDUSTRIES PVT. LTD.	NEW DELHI	
		MULTITEX FILTRATION ENGINEERS LIMITED,	NEW DELHI	
		OTOKLIN GLOBAL BUSINESS LIMITED	MUMBAI	
		SUNGOV ENGINEERING PVT. LTD.	CHENNAI	
45.	ORIFICE PLATE	MICRO PRECISION	FARIDABAD	
		INSTRUMENTAION LTD	PALGHAT	
		CARLO DYNAMICS	HYDERABAD	
46.	STEEL GATE/GLOBE/NR VALVES	A.V. VALVES LTD	AGRA	
		ATAM VALVES PVT. LTD.	JALANDHAR	(1) CARBON STEEL GATE VALVES & NON RETURN VALVES: 15 NB TO 50 NB (#800) & 65 NB TO 300 NB (#150) (2) CARBON STEEL GLOBE VALVES: 15 NB TO 50 NB (#800) & 65 NB TO 200 NB (#150)
		FLUIDLINE VALVES COMPANY PVT.LTD.	KAUSHAMBI	
		M/S GM ENGINEERING	RAJKOT	
		INTERVALVE (INDIA) LTD.	PUNE	A) STEEL GATE VALVES: UPTO 50NB, #800 AND 65NB TO 150NB, #150 B) STEEL GLOBE VALVES: UPTO 50NB, #800 AND 65NB TO 100NB, #150 C) SUPPLIER NOT REGISTERED FOR NR VALVES
		LEADER VALVES LTD.	JALANDHAR	
		NITON VALVE INDUSTRIES PVT LTD	MUMBAI	
		NSSL LIMITED.	NAGPUR	
		STEEL STRONG VALVES (I) PVT.LTD.,	NAVI MUMBAI	LIMITED TO RANGES & CLASSES AS AVAILABE IN VD FILE.
		VENUS PUMPS AND ENGG. WORKS	KOLKATA	CC/CSS-GATE-BBT-UPTO600NB CL UPTO300,GATE-PSBT UPTO250NB CL 1500,GLV-BBT-UPTO300NB CL UPTO600,SCNRV-BBT-UPTO600NB CL UPTO150,SCNRV-BBT-UPTO300NB CL 300,SCNRV-PSBT-UPTO150NB CL UPTO900
		VALTECH INDUSTRIES	MUMBAI	CAST CARBON & ALLOY STEEL - VALVE/RATING/SIZE- GV/150/900,GV/300/400, GV/600/300 , GV/GLV/NRV/900/250 , GLV/300/300,GLV/150/350/ , SCNRV/150/700, SCNRV/300/350, SCNRV/600/250.
		V.K. VALVES PVT. LTD.,	JALANDHAR	
		WEIR BDK VALVES- A UNIT OF WEIR INDIA PVT. LTD.	NEW DELHI	
		H SARKAR	KOLKATA	
47.	SLUICE GATE	JASH ENGINEERING	-	



TITLE:

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1x370 MW KPCL YELAHANKA CCPP
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(ANNEXURE-I)

SPEC NO: PE-TS-409-154-A001,R01

SR. NO.	ITEM	SUPPLIERS	PLACE	REMARKS
		YASHWANT INDUSTRIES		
48.	3 WAY VALVE	HI TECH	AHMEDABAD	
		ADVANCE VALVES PVT.LTD	NOIDA	
		BDK	HUBLI	
		FOURESS ENGG.INDIA LTD.	MUMBAI	
		FLUIDLINEVALVES COMPANY PRIVATE LTD.,	MUMBAI	
		INSTRUMENTATION LTD.	PALAKAD	
		KIRLOSKAR BROTHERS LTD.	PUNE	
		VENUS PUMP & ENGG. WORKS	KOLKATA	
		SURYA VALVES AND INSTRUMENTS MANUFACTURING COMPANY	CHENNAI	
		STAFFORD CONTROLS LIMITED	PUNE	
		MICON VALVES (INDIA) PVT.LTD	MUMBAI	
49.	PLUG VALVE(MANUAL)	BDK	HUBLI	
		HAWA ENGINEERS / MARCK & CARE	-	
		MICON VALVES	-	
		MICON VALVES (INDIA) PVT.LTD	MUMBAI	
50.	FITTINGS (CS/SS)	M.S. FITTINGS	KOLKATA	
		METAL LLOYDS	MUMBAI	
		TRUE FORGE	FARIDABAD	
		TUBE PRODUCTS	BARODA	
		NL HAZRA	KOLKATA	
		GUJRAT INFRA PIPES	BARODA	
		EDWARDS	USA	
		PIPEFIT ENGINEERS	BARODA	
		SIDDARTH & GAUTAM	FARIDABAD	
		EBY	MUMBAI	
51.	FLANGES (SS/CS)	PRADEEP METALS LTD	MUMBAI	
		TUBE PRODUCT INCORPORATION	BARODA	
		MS FITTINGS	KOLKATA	
		HAWA ENGINEERING	-	
		ALIANCE PIPE & PLANGES	KOLKATA	
		JAI AMBE	MUMBAI	
52.	PAINT			
		BERGER PAINTS INDIA LTD		
		GOODLASS NEROLAC		
		JENSON & NICHOLSON (I) LTD		
		CDC CARBOLINE (I) LTD.		
		SHALIMAR PAINTS LTD.		
		ADDISON PAINTS LTD		
		GRAND POLYCOAT		
		BOMBAY PAINTS		
		HEMPLE PAINTS (SINGAPORE)		
		JOTUN PAINTS		

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SPEC NO: PE-TS-409-154-A001,R01

SR. NO.	ITEM	SUPPLIERS	PLACE	REMARKS
53.	PNEUMATIC ACTUATOR	PROCON ENGINEERS	-	
		TYCO	-	
		CRANE PROCESS	-	
		BDK	-	
		INTERVALVE	-	
		BRAY CONTROL	-	
54.	MOTORISED ACTUATOR	ROTARK	-	
		AUMA	-	
		LIMITORK	-	

ITEM CODE	ITEM DESCRIPTION	SL NO.	VENDOR CODE	VENDOR NAME	ADDRESS	PHONE	REMARKS
ES53	LV MOTORS (NON FLAME PROOF)	1	A24	ABB	14, MATHURA ROAD, FARIDABAD, HARYANA-121003	0129-2567580, 09871799449	
	LV MOTORS (NON FLAME PROOF)	2	E1027	BHARAT BULEE LTD.	BHARAT BULEE LIMITED, 1ST FLOOR, 7-B, RAJINDRA PARK, PUSA ROAD, NEW DELHI - 110 060.	Tel.: + 91 (11) 25816931-33, 35 & 36 DT: +91 25724318 Fax: + 91 (11) 25819640 M: + 91	
	LV MOTORS (NON FLAME PROOF)	3	C02	CROMPTON GREAVES	3RD FLOOR, EXPRESS BUILDING, 9-10, BAHADUR SHAH ZAFAR MARG, NEAR ITO CROSSING, NEW DELHI-110002, INDIA	91 11 23460700 - 999 Sunil.Das@cgglobal.com	
	LV MOTORS (NON FLAME PROOF)	4	A35	GE-POWER	KAMAK TOWER, 3RD FLOOR, PLOT NO. 12-A, TVK INDUSTRIAL ESTATE, EKKADUTHANGAL, GUINDY, CHENNAI-600032	044-49681447	
	LV MOTORS (NON FLAME PROOF)	5	K01	KIRLOSKAR ELECTRIC CO LTD.	P.O. BOX 5555, MALLESWARAM WEST, BANGALORE 560055	Tel: +91-80-23374865 Fax: +91-80-23377706	
	LV MOTORS (NON FLAME PROOF)	6	L04	LAXMI HYDRAULICS PVT. LTD	129/130, INDUSTRIAL ESTATE PATIL NAGAR, HOTGI ROAD SOLAPUR-413003, MAHARASHTRA	0217- 2357001-005	APPROVED UPTO 200KW
	LV MOTORS (NON FLAME PROOF)	7	M01	MARATHON	MARATHON ELECTRIC INDIA PRIVATE LTD.SECTOR - 11, MODEL TOWN, FARIDABAD - 121006	Ph: +91-129-2286421, 2265340, 4006601 to 4006610	
	LV MOTORS (NON FLAME PROOF)	8	A35	NGEF	POCKET NO.10, FLAT NO. 37 & 38, EXPANDABLE DDA FLATS, NASIRPUR DWARKA, PHASE-I NEW	Ph: (011) 2539 7763	
	LV MOTORS (NON FLAME PROOF)	9	E1115	RAJINDRA ELECT INDUSTRIES	14 SHAH IND. ESTATE VEERA DESAI RD, ANDHERI(W) MUMBAI-400053	91-22-26730823, 26730789; 91)-(22)-26730154	
	LV MOTORS (NON FLAME PROOF)	10	S01	SIEMENS	RC-IN I S NR DEL AREA, JIL BUILDING, TOWER-B, PLOT NO. 78, SECTOR 18, GURGAON-122015, INDIA	0124-2842000, 9873424331 amit.bhadoria@siemens.com	
ES54	LV MOTORS (FLAME PROOF)	1	E1115	RAJINDRA ELECT INDUSTRIES	14 SHAH IND. ESTATE VEERA DESAI RD, ANDHERI(W) MUMBAI-400053	91-22-26730823, 26730789; 91)-(22)-26730154	


TITLE:

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SPEC NO: PE-TS-409-154-A001,R01

SLNO	Package Name	Vendor Name	Vendor Address	Remarks
1	INSTRUMENT FITTINGS	VIKAS INDUSTRIAL PRODUCTS	S.R.SINGH/NAVEEN SINGH B - 2, SECTOR - 6, NOIDA-UTTAR PRADESH-INDIA Phone- +91-9810122070 Pincode : 201301 Email : naveensingh@vsnl.com	
		PRECISION ENGINEERING INDUSTRIES	K. SITARAM/ K. SRINIVAS 7,SIDHAPURA INDUSTRIAL ESTATE S.V. ROAD,GOREGAON(W) MUMBAI-MAHARASHTRA-INDIA Phone- 022 42631700 Pincode : 400 062 Email : peiks@vsnl.com	
		PANAM ENGINEERS	Mr. Santosh Shukla 203, Jaisingh Business,Parsiwada, Sahar road,Andheri(East), Mumbai,-Maharashtra,-India, Phone- 9892179529, Pincode : 400099, Email : santosh@panamengineers.com,	
		Perfect Instrumentation Control (India) Pvt. Ltd.	MD Hussain Shaikh/Shahanawaz Khan Gala No. 168, Loheki Chwal,216/ 218, Maulana Azad Rd. Nagpada Junction Mumbai-Maharashtra-INDIA Phone- 91-9324383121 Pincode : 400008 Email : shahanawaz.khan@perfectinstrumentation.com	
		Comfit & Valve Pvt. Ltd.	Mr. Jeetu Jain/Mr. Vinay Sosa Survey No. 23/1, Part 2, Ahmedabad-Mehsana Highway Laxmipura, Nandasan-Gujarat-INDIA Phone- 02764-267036/37 Pincode : 382705 Email : marketing@com-fit.com	
		AURA INCORPORATED	NIRAJ SHARAN/SUJIT KUMAR W-167A, GREATER KAILASH-II NEW DELHI-DELHI-INDIA Phone- 9810182430 Pincode : 110048 Email : niraj@aurainc.com	
		Arya Crafts & Engineering Pvt. Ltd.	Mr.Sanjay Brahman/Mr.Shyam Vazirani 102, Vora Industrial Estate No.4 Navghar, Vasai Road (E) Dist.Thane, Mumbai-Maharashtra-INDIA Phone- +91-250-2392246 Pincode : 401210 Email : arya@aryaengg.com	
		FLUIDFIT ENGINEERS PVT. LTD.	Mr. Abbas Bhola Potia Building No. 2, Office No. 3,292, Bellasis Road,Mumbai Central (East) Mumbai-Maharashtra-India Phone- 9920044113 Pincode : 400008 Email : ab@fluidfitengg.com	
		HP VALVES & FITTINGS INDIA PVT. LTD.	S. Harichandran/P.S. Pandi B-11, Mugappair Industrial Estate, CHENNAI-Tamilnadu-INDIA Phone- 044 26252537 Pincode : 600037 Email : sales@hpvalvesindia.com	
		Fluid Controls Pvt. Ltd.	Sophie Y. Mochhala/Mayur Rajput J.V.PATEL, I.T.I CMPD, B.MADHUKAR MARG, ELPHINSTONE ROADSTN.(WR), MUMBAI-MAHARASHTRA-INDIA Phone- (022) 43338000 Pincode : 400013 Email : sales@fluidcontrols.com	
2	INSTRUMENTS PIPE FITTINGS	Fluid Controls Pvt. Ltd.	Sophie Y. Mochhala/Mayur Rajput J.V.PATEL, I.T.I CMPD, B.MADHUKAR MARG, ELPHINSTONE ROADSTN.(WR), MUMBAI-MAHARASHTRA-INDIA Phone- (022) 43338000 Pincode : 400013 Email : sales@fluidcontrols.com	
		AURA INCORPORATED	NIRAJ SHARAN/SUJIT KUMAR W-167A, GREATER KAILASH-II NEW DELHI-DELHI-INDIA Phone- 9810182430 Pincode : 110048 Email : niraj@aurainc.com	
		PRECISION ENGINEERING INDUSTRIES	K. SITARAM/ K. SRINIVAS 7,SIDHAPURA INDUSTRIAL ESTATE S.V. ROAD,GOREGAON(W) MUMBAI-MAHARASHTRA-INDIA Phone- 022 42631700 Pincode : 400 062 Email : peiks@vsnl.com	
		VIKAS INDUSTRIAL PRODUCTS	S.R.SINGH/NAVEEN SINGH B - 2, SECTOR - 6, NOIDA-UTTAR PRADESH-INDIA Phone- +91-9810122070 Pincode : 201301 Email : naveensingh@vsnl.com	

3	INSTRUMENTS TUBE FITTINGS	VIKAS INDUSTRIAL PRODUCTS	S.R.SINGH/NAVEEN SINGH B - 2, SECTOR - 6, NOIDA-UTTAR PRADESH-INDIA Phone- +91-9810122070 Pincode : 201301 Email : naveensingh@vsnl.com	
		PRECISION ENGINEERING INDUSTRIES	K. SITARAM/ K. SRINIVAS 7,SIDHAPURA INDUSTRIAL ESTATE S.V. ROAD,GOREGAON(W) MUMBAI-MAHARASHTRA-INDIA Phone- 022 42631700 Pincode : 400 062 Email : peiks@vsnl.com	
		AURA INCORPORATED	NIRAJ SHARAN/SUJIT KUMAR W-167A, GREATER KAILASH-II NEW DELHI-DELHI-INDIA Phone- 9810182430 Pincode : 110048 Email : niraj@aurainc.com	
		Fluid Controls Pvt. Ltd.	Sophie Y. Mochhala/Mayur Rajput J.V.PATEL, I.T.I CMPD, B.MADHUKAR MARG, ELPHINSTONE ROADSTN.(WR), MUMBAI-MAHARASHTRA-INDIA Phone- (022) 43338000 Pincode : 400013 Email : sales@fluidcontrols.com	
4	JUNCTION BOX	FLEXPRO ELECTRICALS PVT. LTD.	Mr. Dineshbhai Zaveri C-1/ 27&37, GIDC, Kabilpore, Navsari-Gujarat-India Phone- 02637-265140,265003 Pincode : 396424 Email : flexpro@flexproltd.com	
		AJMERIA INDUSTRIAL & ENGINEERING WORKS	JIGNESH MAHENDRA AJMERA DENA BANK BLDG.,SHREE NAGESH INDL. ESTATE,STATION ROAD, MUMBAI-MAHARASHTRA-INDIA Phone- 022 67973578 Pincode : 400 088 Email : ajmerna@ajmerna.net, jmajmerna@yahoo.com	
		K.S.INSTRUMENTS PVT.LTD.	S Raghavan No. 72, 3rd Main, 1st Stage Industrial Suburb, Yeshwanthpur Bangalore-Karnataka-India Phone- 9880385770 Pincode : 560022 Email : sales1@ksinstruments.net	
		SUCHITRA INDUSTRIES	NO-2,OPP-27 AECS LAYOUT 2ND STG REJAMAHALVILAS EXTN 2ND STG BANGALORE - Phone- Pincode : Email : suchitra.industriesblr@gmail.com	
		Shrenik & Company,	Mr. Mitesh Shah/Mr. Pulin Shah 39 A/3 ,Panchratna Industrial Estate, Sarkhej-Bavla Road Ahmedabad-Gujarat-India Phone- 9825024921 Pincode : 382213 Email : sales@pustron.com, pulin@sumip.com	
5	LEVEL GAUGE	TOSHNIWAL BROTHERS PVT.LTD.	WORKS:TOSHNIWAL IND.PVT.LTD, INDUSTRIAL ESTATE MAKHUPURA, AJMER-RAJASTHAN-INDIA Phone- 441171 Pincode : 305002 Email : toshniwalprocess@gmail.com	MAKE:NIVO CONTROLS
		SIGMA INSTRUMENTS CO.	Gopal Kannan/R Gopinath 201, ANANDRAJ INDUSTRIAL ESTATE, OFF.LBS MARG, SONAPUR LANE, BHANDUP (W) MUMBAI-MAHARASHTRA-INDIA Phone- +919821038162 Pincode : 400078 Email : sales@sigmainstruments.co.in	
		BLISS ANAND PVT. LTD.	Mr. Vikas Anand/ Mr.RGRajan 92B & 93 B, IMT MANESAR Gurgaon-Haryana-India Phone- 0124-4366000 TO 9 Pincode : 122001 Email : sales@blissanand.com	
		BLISS ANAND PVT. LTD.	Mr. Vikas Anand/ Mr.RGRajan 92B & 93 B, IMT MANESAR Gurgaon-Haryana-India Phone- 0124-4366000 TO 9 Pincode : 122001 Email : sales@blissanand.com	
		Flow Star Engineering Pvt. Ltd.,	MR. KHALID AKHTAR/MR. TAPAN KUMAR JANA Plot No-7 F/2, Northern India Industrial 20/3, Mathura Road FARIDABAD-HARYANA-INDIA Phone- 9818176380 Pincode : 121005 Email : khalid@flowstar.co.in	
		SOR INC.	LARRY DEGARMO/Avdhesh Chandra, 14685 W. 105TH STREET LENEXA-KANSAS-USA Phone- 09810905139, Pincode : 66215 Email : Ldegarmo@sorinc.com, avdhesh@sherman-india.com,	


TITLE:

**KARNATAKA POWER CORPORATION LIMITED
1x370 MW KPCL YELAHANKA CCPP
TECHNICAL SPECIFICATION FOR CHEMICAL DOSING SYSTEM
(ANNEXURE-I)**

SPEC NO: PE-TS-409-154-A001,R01

6	LEVEL SWITCH-CAPACITANCE TYPE	SIGMA INSTRUMENTS CO.	Gopal Kannan/R Gopinath 201, ANANDRAJ INDUSTRIAL ESTATE, OFF.LBS MARG, SONAPUR LANE, BHANDUP (W) MUMBAI-MAHARASHTRA-INDIA Phone- +919821038162 Pincod : 400078 Email : sales@sigmainstruments.co.in	
		LEVCON INSTRUMENTS PVT. LTD.	Mr Shayak Gupta/Badal Jana Rajkamal, 7th floor, 13, Camac Street KOLKATA-WEST BENGAL-INDIA Phone- 0 33 2283 2766 Pincod : 700017 Email : b_jana@levcongroup.com	
		NIVO CONTROLS PVT. LTD.	MR.PRAVEEN TOSHNIWAL/MR. NITIN TAMHANE 104-115, ELECTRONIC COMPLEX, INDORE-MAHARASHTRA-INDIA Phone- 07314081300 Pincod : 452010 Email : sales@nivocontrols.com	
		Pune Techtrol Pvt. Ltd.	N.P.Khatan/Sudhakar Badiger S-18, MIDC Bhosari, Pune-Maharashtra-INDIA Phone- 9850560042 Pincod : 411 026 Email : ho@punetechtrol.com	
		Sapcon Instrument Pvt Ltd.	131, PALSHIKAR COLONY Contact Person- Mr. Ashwin (9826080207) INDORE-MP-INDIA Phone- +91-731-4085751, Pincod : 452004 Email : sales@sapconinstruments.com	
		V. AUTOMAT & INSTRUMENTS (P) LTD.	Mr. R. K. BASSI/Mr. PRAVEEN KUMAR F-61, OKHLA INDLAREA, PH-1 NEW DELHI-INDIA Phone- 9810005826 Pincod : 110 020 Email : sales@vautomat.com	
		Baumer Technologies India Pvt. Ltd.	Mr. Shyam Warilani/Mr. V Suresh Babu 36, DAMJI SHAMJI INDUSTRIAL COMPLEX, OFF.-MAHAKALI CAVES ROAD, ANDHERI(E) MUMBAI-Maharashtra-INDIA Phone- +91 99589 25151 Pincod : 400093 Email : sales.in@baumer.com	
7	LEVEL SWITCH-CONDUCTIVITY TYPE	V. AUTOMAT & INSTRUMENTS (P) LTD.	Mr. R. K. BASSI/Mr. PRAVEEN KUMAR F-61, OKHLA INDLAREA, PH-1 NEW DELHI-INDIA Phone- 9810005826 Pincod : 110 020 Email : sales@vautomat.com	
		Sapcon Instrument Pvt Ltd.	131, PALSHIKAR COLONY Contact Person- Mr. Ashwin (9826080207) INDORE-MP-INDIA Phone- +91-731-4085751, Pincod : 452004 Email : sales@sapconinstruments.com	
		LEVCON INSTRUMENTS PVT. LTD.	Mr Shayak Gupta/Badal Jana Rajkamal, 7th floor, 13, Camac Street KOLKATA-WEST BENGAL-INDIA Phone- 0 33 2283 2766 Pincod : 700017 Email : b_jana@levcongroup.com	
		SIGMA INSTRUMENTS CO.	Gopal Kannan/R Gopinath 201, ANANDRAJ INDUSTRIAL ESTATE, OFF.LBS MARG, SONAPUR LANE, BHANDUP (W) MUMBAI-MAHARASHTRA-INDIA Phone- +919821038162 Pincod : 400078 Email : sales@sigmainstruments.co.in	
		RAMAN INSTRUMENTS PVT.LTD.	Mr. N R Shenoy/Mr G B Viji 8, First Floor.Plot : 160A Bait-Ush-Sharaf, 29th Road,Bandra(W) MUMBAI-Maharashtra-India Phone- 09892331381 Pincod : 400050 Email : ramanbpl@vsnl.com	Vendor shall source import contents of Level Switch (Conductivity Type) from Mobrey Measurement, an operating unit of Morbey Ltd., Slough, Berkshire, United Kingdom.
		SOR INC.	LARRY DEGARMO/Avdresh Chandra, 14685 W. 105TH STREET LENEXA-KANSAS-USA Phone- 09810905139, Pincod : 66215 Email : Ldegarmo@sorinc.com, avdresh@sherman-india.com,	

8	LEVEL SWITCH-FLOAT TYPE	HI-TECH SYSTEMS & SERVICES LTD.	Mr. Vikash Agrawal/Mr. Tarun Debnath 119, PARK STREET , KOLKATA-West Bengal-India Phone- 033-22290045 Pincod : 700016 Email : sandeep@hitech.in	Vendor shall source import contents of Level Switch (Conductivity Type) from Levelstate Systems Ltd., United Kingdom.
		BLISS ANAND PVT. LTD.	Mr. Vikas Anand/ Mr.RGRajan 92B & 93 B , IMT MANESAR Gurgaon-Haryana-India Phone- 0124-4366000 TO 9 Pincod : 122001 Email : sales@blissanand.com	
		BLISS ANAND PVT. LTD.	Mr. Vikas Anand/ Mr.RGRajan 92B & 93 B , IMT MANESAR Gurgaon-Haryana-India Phone- 0124-4366000 TO 9 Pincod : 122001 Email : sales@blissanand.com	
		D.K. INSTRUMENTS PVT.LTD.	N.SIKDAR/ SUMIT SIKDAR 76/2,SELIMPUR RD DHAKURIA Kolkata-West Bengal-India Phone- 033-2415-1310. Pincod : 700031 Email : dkinst@vsnl.net	
		GENERAL INSTRUMENTS CONSORTIUM	Mr. Amarendra Kulkarni 194/195, Gopi Tank Road, Off. Pandurang Naik Marg, Mahim Mumbai-Maharashtra-India Phone- 9323195251 Pincod : 400016 Email : amarendra@general-gauges.com	
		SOR INC.	LARRY DEGARMO/Avdresh Chandra, 14685 W. 105TH STREET LENEXA-KANSAS-USA Phone- 09810905139, Pincod : 66215 Email : Ldegarmo@sorinc.com, avdresh@sherman-india.com,	
		SIGMA INSTRUMENTS CO.	Gopal Kannan/R Gopinath 201, ANANDRAJ INDUSTRIAL ESTATE, OFF.LBS MARG, SONAPUR LANE, BHANDUP (W) MUMBAI-MAHARASHTRA-INDIA Phone- +919821038162 Pincod : 400078 Email : sales@sigmainstruments.co.in	
		LEVCON INSTRUMENTS PVT. LTD.	Mr Shayak Gupta/Badal Jana Rajkamal, 7th floor, 13, Camac Street KOLKATA-WEST BENGAL-INDIA Phone- 0 33 2283 2766 Pincod : 700017 Email : b_jana@levcongroup.com	
		Pune Techtrol Pvt. Ltd.	N.P.Khatan/Sudhakar Badiger S-18, MIDC Bhosari, Pune-Maharashtra-INDIA Phone- 9850560042 Pincod : 411 026 Email : ho@punetechtrol.com	
		SBEM PVT. LTD.	MR.N.K. BEDARKAR/MR. VISHWANATH KARANDIK 39, ELECTRONIC CO.OP. ESTATE, PUNE SATARA ROAD PUNE,-MAHARASHTRA-INDIA Phone- 912041030100 Pincod : 411009 Email : newdelhi@sbem.co.in	
		V. AUTOMAT & INSTRUMENTS (P) LTD.	Mr. R. K. BASSI/Mr. PRAVEEN KUMAR F-61, OKHLA INDLAREA, PH-1 NEW DELHI-INDIA Phone- 9810005826 Pincod : 110 020 Email : sales@vautomat.com	
		Baumer Technologies India Pvt. Ltd.	Mr. Shyam Warilani/Mr. V Suresh Babu 36, DAMJI SHAMJI INDUSTRIAL COMPLEX, OFF.-MAHAKALI CAVES ROAD, ANDHERI(E) MUMBAI-Maharashtra-INDIA Phone- +91 99589 25151 Pincod : 400093 Email : sales.in@baumer.com	
		Baumer Technologies India Pvt. Ltd.	Mr. Shyam Warilani/Mr. V Suresh Babu 36, DAMJI SHAMJI INDUSTRIAL COMPLEX, OFF.-MAHAKALI CAVES ROAD, ANDHERI(E) MUMBAI-Maharashtra-INDIA Phone- +91 99589 25151 Pincod : 400093 Email : sales.in@baumer.com	
		GAUGE BOURDON INDIA PVT. LTD.	194/195, Gopi Tank Road, Off Pandurang Naik Marg, Mahim Mumbai,-Maharashtra,-India, Phone- 011-41607463, Pincod : 400016, Email : gicdelhi@general-gauges.com,	


TITLE:

**KARNATAKA POWER CORPORATION LIMITED
1x370 MW KPCL YELAHANKA CCPP
TECHNICAL SPECIFICATION FOR CHEMICAL DOSING SYSTEM
(ANNEXURE-I)**

SPEC NO: PE-TS-409-154-A001,R01

9	PRESSURE GAUGE/ DIFF.PRESSURE GAUGE	H.GURU INDUSTRIES	Mr. G. D. Hazra/Mr. P. K. Mitra 10 B, HO-CHI-MINH SARANI, KOLKATA-WEST BENGAL-INDIA Phone- 033 2282 2463 / 1637 Pincode : 700071 Email : mguru@vsnl.net	
		H.GURU INSTRUMENTS (SOUTH INDIA) P. LTD	32,INDUSTRIAL SUBURB YESWANTHAPUR BANGALORE-KARNATAKA- www.hgurusouth.com Phone- 080-23370300, Pincode : 560022 Email : info@hgurusouth.com	
		FORBES MARSHALL (HYD) LTD.	MR SAILESH PATALAY/MR. M K SRINIVASAN PLOT NO.A-19/2, & T-4/2, IDA, NACHARAM, HYDERABAD-TELANGANA-INDIA Phone- 9849913704 Pincode : 500 076 Email : mksrinivasan@forbesmarshall.com	
		BOSE PANDA INSTRUMENTS PVT.LTD.	Mr. Partha Bose 44, Saheed Hemanta Kumar Bose, Sarani, Kolkata-West Bengal-India Phone- +91 33 2548 7220 Pincode : 700074 Email : parthabosebpi@gmail.com; bosepanda@vsnl.net	
		PRECISION MASS PRODUCTS PVT. LTD.	Mr. Nishit Patel/Mr. Anuj Verma Plot No.2306, Phase II, GIDC Chhatral Kalol-Gujarat,- INDIA Phone- 9999464663 Pincode : 382729 Email : sales@precisionmass.com	
		A.N. INSTRUMENTS PVT. LTD.	MARKETING DIVISION, 5th FLOOR, 59-B, CHOWRINGHEE ROAD, KOLKATA-WEST BENGAL-INDIA Phone- 24757784,22472509 Pincode : 700020 Email : anidel@bol.net.in	
10	PRESSURE SWITCH/DIFF. PRESSURE SWITCH	PRECISION MASS PRODUCTS PVT. LTD.	Mr. Nishit Patel/Mr. Anuj Verma Plot No.2306, Phase II, GIDC Chhatral Kalol-Gujarat,- INDIA Phone- 9999464663 Pincode : 382729 Email : sales@precisionmass.com	
		Barksdale GmbH, Germany	Michael Weileder Dorn Assenheimer, Strasse 27 Reichelsheim--Germany Phone- +91- 9999107840 Pincode : D-61203 Email : msingh@barksdale.de	
		DRESSER INDUSTRIES INC.	Mr. Nishit Patel/Mr. Anuj Verma Plot No.2306, Phase II, GIDC Chhatral Kalol-Gujarat- India Phone- 02764-233682 Pincode : 382729 Email : Nishit.patel@ashcroftindia.com	
		INDFOS (INDIA) LIMITED	MRL.C.VENKATRANGAN/MR.B.KANNAN New No.17, II Floor, Adwave Towers, Dr.Sevalia Shivaji Salai, T.Nagar Chennai-TamilNadu-INDIA Phone- +91 44 24353407 Pincode : 600017 Email : delhi@indfos.com	
		GENERAL INSTRUMENTS CONSORTIUM	Mr. Amarendra Kulkarni 194/195, Gopi Tank Road, Off. Pandurang Naik Marg, Mahim Mumbai-Maharashtra-India Phone- 9323195251 Pincode : 400016 Email : amarendra@general-gauges.com	
		Kaustubha Udyog,	S.No. 36/1/1, Singhgad Road, Vadgaon Khurd, Near Lokmat Press, Pune,-Maharashtra,- India, Phone- 020-24393577, Pincode : Email : pressure@vsnl.com,	
		INDFOS INDUSTRIES LIMITED	B-20-21, INDUSTRIAL AREA, MEERUT ROAD, GHAZIABAD-UP-INDIA Phone- 0120- 2712016 Pincode : Email : mktg@indfos.com	
		SWITZER PROCESS INSTRUMENTS PVT. LTD.	B Kannan/V S Jayaprakash 9, SOUTH BOAG ROAD, II FLOOR, PB NO-1423, T.NAGAR, CHENNAI-TAMIL NADU-INDIA Phone- 044-24340999 / 24344 Pincode : 600017 Email : marketing@switzerinstrument.com	
11	TRANSMITTERS	SOR INC.	LARRY DEGARMO/Avdresh Chandra, 14685 W. 105TH STREET LENEXA-KANSAS-USA Phone- 09810905139, Pincode : 66215 Email : Ldegarmo@sorinc.com, avdresh@sherman-india.com,	
		Honeywell Automation India Limited	Mr. Ritwij Kulkarni 917, INTERNATIONAL TRADE TOWER, NEHRU PLACE, NEW DELHI- DELHI-INDIA Phone- 9890200584 Pincode : 110019 Email : rajesh.chaudhary@honeywell.com	
		V. AUTOMAT & INSTRUMENTS (P) LTD.	Mr. R. K. BASSI/Mr. PRAVEEN KUMAR F-61, OKHLA INDLAREA, PH-1 NEW DELHI- DELHI-INDIA Phone- 9810005826 Pincode : 110 020 Email : sales@vautomat.com	a)DISPLACEMENT TYPE TRANSMITTERS. b)PRESSURE AND DP TRANSMITTERS
		TOSHNIWAL INDUSTRIES PVT. LTD.,	Industrial Estate, Makhapura, Ajmer,-Rajasthan,-India, Phone- 9352009000, Pincode : 305002, Email : info@tipl.com,	
		YOKOGAWA INDIA LIMITED,	PLOT NO.96, ELECTRONICS CITY COMPLEX, HOSUR ROAD, BANGALORE,- KARNATAKA,-INDIA, Phone- 080-41586000, Pincode : Email : uday.shankar@in.yokogawa.com,	
		SIEMENS LIMITED	Dr. Armin Bruck/Sandeep Mathur 130, Pandurang Budhkar Marg Worli Mumbai- Maharashtra-INDIA Phone- 0124 383 7377 Pincode : 400018 Email : ankit.varshney@siemens.com	
		EMERSON PROCESS MANAGEMENT (INDIA) PVT.LTD.	Mr. Amit Paithankar/Vikram Raj Singh 206-210,BALARAMA BUILDING 2ND FLR. BANDRA EAST MUMBAI-MAHARASHTRA-INDIA Phone- 9619121500 Pincode : 400051 Email : vikramraj.singh@emerson.com	
		SMART INSTRUMENTS LTD, BRAZIL	Agents: Digital Electronic Ltd. 74/11 'C' Cross Road MIDC Andheri (East) MUMBAI- MAHARASHTRA-INDIA Phone- 28208477 Pincode : 400093 Email : corp@delbby.rpgms.ems.vsnl.net.in	LD-301 & T-301 TRANSMITTER FROM M/S SMART EQUIPMENTS BRAZIL.
		SBEM PVT. LTD.	MR.N.K. BEDARKAR/MR. VISHWANATH KARANDIK 39, ELECTRONIC CO.OP. ESTATE, PUNE SATARA ROAD PUNE,-MAHARASHTRA-INDIA Phone- 912041030100 Pincode : 411009 Email : newdelhi@sbem.co.in	FOR CAPACITANCE TYPE.
		Pune Techtrol Pvt. Ltd.	N.P.Khatan/Sudhakar Badiger S-18, MIDC Bhosari, Pune-Maharashtra-INDIA Phone- 9850560042 Pincode : 411 026 Email : ho@punetechtrol.com	Only for capacitance Type Level Transmitter
		PANAM ENGINEERS	Mr. Santosh Shukla 203, Jaisingh Business,Parsiwada, Sahar road,Andheri(East), Mumbai,-Maharashtra,-India, Phone- 9892179529, Pincode : 400099, Email : santosh@panamengineers.com,	For Pressure and Diff. Pressure transmitter
		NIVO CONTROLS PVT. LTD.	Mr. Praveen Toshniwal 104-115, Electronic Complex, Indore-M.P.-India Phone- 0731- 4081305 Pincode : 452010 Email : sales@nivocontrols.com	For Capacitance type only
		Moore Industries International Inc.	Leonard.W. Moore/ Matt Moren 16650 Schoenborn St. North Hills-CALIFORNIA-USA Phone- +1 818 830 5548 Pincode : 91343 Email : mmoren@miinet.com	
		Endress + Hauser (India) Pvt. Ltd.,	Mr. Prakash Vaghela 215-216, DLF Tower 'A', Jasola District Centre, New Delhi,-New Delhi,-India, Phone- 9717593001, Pincode : 110025, Email : prakash.vaghela@in.endress.com,	
		ABB LIMITED	MR. RAJIV GOVIL 14, MATHURA ROAD, FARIDABAD-HARYANA-INDIA Phone- 09971085678 Pincode : 121003 Email : vipin.swami@in.abb.com	PRESSURE TRANSMITTER, DP TRANSMITTER AND TEMP TRANSMITTER

**TITLE:**

**KARNATAKA POWER CORPORATION LIMITED
1x370 MW KPCL YELAHANKA CCPP
TECHNICAL SPECIFICATION FOR CHEMICAL DOSING SYSTEM
(ANNEXURE-I)**

SPEC NO: PE-TS-409-154-A001,R01

NOTES-

1. All the finally selected sub vendors shall be subject to customer approval during detailed engineering without any delivery/ commercial implications to BHEL/ Customer (KPCL).
2. The sub vendor list enclosed is indicative only and is subject to approval / acceptance by customer (KPCL).
3. Bidder to propose his sub vendor list with back up documents (experience list, end user certificate as applicable) etc. The same shall subject to BHEL and Customer approval during detailed engineering stage without any technical, commercial & delivery implication to BHEL or customer.

Bidder to propose sub vendor within 4 weeks of placement of LOI. Thereafter no request for additional sub vendor shall be entertained.

4. The inspection category will be intimated after award of contract by BHEL/customer. However the same will be adhered by the bidder without any commercial and delivery implication to BHEL/ Customer (KPCL).
5. Dealers are not acceptable for any item of the package. Bidder shall procure all items including plates, structural, flanges; counter flanges etc. From approved sub vendor only.



TITLE:

**KARNATAKA POWER CORPORATION LIMITED
1x370 MW KPCL YELAHANKA CCPP
TECHNICAL SPECIFICATION FOR CHEMICAL DOSING SYSTEM
(ANNEXURE-II)**

SPEC NO: PE-TS-409-154-A001,R01

MANDATORY SPARES LIST

**TITLE:**

KARNATAKA POWER CORPORATION LIMITED
1x370 MW KPCL YELAHANKA CCPP
TECHNICAL SPECIFICATION FOR CHEMICAL DOSING SYSTEM
(ANNEXURE-II)

SPEC NO: PE-TS-409-154-A001,R01

S. No	Spares	Unit	Quantity
1.0	<u>HP / LP and CW Chemical Dosing System:</u>		
	Following spares shall be supplied for each type of pump and agitator under each system.		
(a)	Dosing Pumps		
(i)	Plunger / Diaphragm	Set	One (1)
(ii)	Pump bearings	Set	One (1)
(iii)	“O” Rings / Gland packing	Set	One (1)
(iv)	Ball valves / Globe valves	Nos.	One (1)
(v)	Relief valves	Nos.	Two (2)
(vi)	Oil and grease seals	Nos.	One (1)
(b)	Motorised Agitator		
(i)	Impeller / Propeller with shaft	No.	One (1) for each agitator.



TITLE:

**KARNATAKA POWER CORPORATION LIMITED
1x370 MW KPCL YELAHANKA CCPP
TECHNICAL SPECIFICATION FOR CHEMICAL DOSING SYSTEM
(ANNEXURE-III)**

SPEC NO: PE-TS-409-154-A001,R01

LIST OF ERECTION & COMMISSIONING SPARES



TITLE:

KARNATAKA POWER CORPORATION LIMITED
1x370 MW KPCL YELAHANKA CCPP
TECHNICAL SPECIFICATION FOR CHEMICAL DOSING SYSTEM
(ANNEXURE-III)

SPEC NO: PE-TS-409-154-A001,R01

SL. NO.	ITEM DESCRIPTION	Quantity per skid (No.)	TOTAL NOS.
1.0	AMMONIA DOSING SYSTEM		
1.1	Oil Seals for drive end.	4	4
1.2	Gaskets for drive end	4	4
1.3	Guide ring for plunger.	4	4
1.4	Teflon rings for valves.	8	8
1.5	Level gauge glass	1	1
1.6	Back up fuse	3	3
1.7	Pilot lamp	2	2
1.8	Push Button	2	2
1.9	Control fuse	2	2
1.10	Bulb for Annunciation	4	4
1.0	HYDRAZINE DOSING SYSTEM		
1.1	Oil Seals for drive end.	4	4
1.2	Gaskets for drive end	4	4
1.3	Guide ring for plunger.	4	4
1.4	Teflon rings for valves.	8	8
1.5	Level gauge glass	1	1
1.6	Back up fuse	3	3
1.7	Pilot lamp	2	2
1.8	Push Button	2	2
1.9	Control fuse	2	2
1.10	Bulb for Annunciation	4	4
1.0	NaOH DOSING SYSTEM		
1.1	Level gauge glass	1	1
1.2	Back up fuse	3	3
1.3	Pilot lamp	2	2
1.4	Push Button	2	2
1.5	Control fuse	2	2
1.6	Bulb for Annunciation	4	4
1.0	PHOSPHATE DOSING SYSTEM		
1.0	Oil Seals for drive end.	12	12
1.1	Gaskets for drive end	12	12
1.2	Guide ring for plunger.	12	12
1.3	Teflon rings for valves.	24	24
1.4	Level gauge glass	2	2
1.5	Back up fuse	3	3
1.6	Pilot lamp	2	2
1.7	Push Button	2	2
1.8	Control fuse	2	2
1.9	Bulb for Annunciation	4	4

Note: -

- Any other commissioning spare/ special tools and tackles required for the commissioning of the bidder's chemical dosing skids shall be in bidder's scope and same shall be supplied by bidder as part of his base offer and the same shall be mentioned specifically by the bidder in the un-priced schedule.
- All the commissioning spares provided shall be strictly of the same make and specification of the items it shall replace and shall be perfectly interchangeable.
- All the commissioning spares shall be separately packed and properly marked for easy identification at site.

**TITLE:**

KARNATAKA POWER CORPORATION LIMITED
1x370 MW KPCL YELAHANKA CCPP
TECHNICAL SPECIFICATION FOR CHEMICAL DOSING SYSTEM
(ANNEXURE-IV)

SPEC NO: PE-TS-409-154-A001,R01

LIST OF TOOLS & TACKLES

Bidder to consider necessary tools and tackles for mechanical, electrical and control & instrument as per their system requirement. In addition bidder to adhere relevant clauses of tender specification also. List of tools and tackles to be furnish by bidder during bid submission.

**TITLE:**

KARNATAKA POWER CORPORATION LIMITED
1x370 MW KPCL YELAHANKA CCPP
TECHNICAL SPECIFICATION FOR CHEMICAL DOSING SYSTEM
(ANNEXURE-V)

SPEC NO: PE-TS-409-154-A001,R01

DRAWINGS/DOCUMENTS DISTRIBUTION & SUBMISSION

**TITLE:**

**KARNATAKA POWER CORPORATION LIMITED
1x370 MW KPCL YELAHANKA CCPP
TECHNICAL SPECIFICATION FOR CHEMICAL DOSING SYSTEM
(ANNEXURE-V)**

SPEC NO: PE-TS-409-154-A001,R01

- Bidder shall submit soft copy/hard copy/CD ROMs of all the finally approved drawings and O&M Manuals as required by Customer/Customer consultant/BHEL-site/BHEL-PEM. The exact number of hard copies/CD ROMs of these documents to be submitted shall be notified to the bidder at the time of detailed engineering and bidder shall submit the same without any commercial/delivery implications to BHEL/Customer.
- All the drawing documents along with the O&M manual (of all the revisions) are necessarily to be submitted in soft copies in addition to hard copies.
- Bidder to submit soft copies of all the drawing and document along with quality plans for BHEL review and approval.
- Editable copy of all the drawings and documents shall be provided.
- The date of submission of drawing documents shall be considered as the date of submission of hard and soft copies whichever is later.
- All the drawings shall be prepared on computer auto cad and other documents (like datasheet etc.) on MS office software. Bidder not complying to the requirement shall not be considered. For the execution of the contract regular meeting (generally once in 15 days or as per project requirement) is required.
- Vendor to come for meeting with the concerned dealing persons as per BHEL or customer requirement in a short notice.
- Bidder to submit instrument schedule, cable schedule and valve schedule in MS- Excel format during detailed engineering.
- Bidder to also furnish the auto cad copy/MS-Excel/MS-word (as applicable) of the following documents after award of contract. However any other auto cad copy/MS-Excel/MS-word of any other document as per the insistence of BHEL and customer will also be submitted by the bidder without any delivery and commercial implication to BHEL and customer.
 - P&IDs.
 - GA & FOUNDATION DETAILS OF OXYGEN DOSING SKIDS
 - JUNCTION BOX TERMINATION DRAWINGS

Other requirements

- Successful bidder shall furnish detailed erection manual for each of the equipment as well as complete system supplied under this contract at least 3 months before the scheduled erection of the concerned equipment / component or along with supply of concerned equipment / component whichever is earlier.
- Document approval by customer under Approval category or information category shall not absolve the vendor of their contractual obligations of completing the work as per specification requirement. Any deviation from specified requirement shall be reported by the vendor in writing and require written approval. Unless any change in specified requirement has been brought out by the vendor during detail engineering in writing while submitting the document to customer for approval, approved document (with implicit deviation) will not be cited as a reason for not following the specification requirement.
- In case vendor submits revised drawing after approval of the corresponding drawing, any delay in approval of revised drawing shall be to vendor's account and shall not be used as a reason for extension in contract completion. However, in case changes are necessitated due to any constraints at customer end, delay in review/ approval of such revised drawing beyond one month will be to customer's account.


TITLE:

**KARNATAKA POWER CORPORATION LIMITED
1x370 MW KPCL YELAHANKA CCPP
TECHNICAL SPECIFICATION FOR CHEMICAL DOSING SYSTEM
(ANNEXURE-V)**

SPEC NO: PE-TS-409-154-A001,R01

S. NO.	DESCRIPTION	CONSULTANT	KPCL HEAD OFFICE	KPCL SITE	BHEL UNIT	BHEL SITE
A	POST CONTRACT CORRESPONDENCE	1	S	1	1	0
		0	1	S	1	1
		0	1	1	S	1
		0	1	1	1	S
B	DRAWINGS/DOCUMENT SUBMISSION					
	A) SUBMISSION	0	7	0	S	0
	B) RETURN OF SUBMISSION WITH COMMENTS/APPROVAL BY RPCL	1	S	1	2	0
	C) RFC ISSUE	0	2	2	S	4
	D) AS BUILT	0	2	2	S	1
	E) ERECTION DRAWINGS	0	0	3	S	5
C	PROGRESS REPORT (MONTHLY)					
	EPC CONTRACTOR'S REPORT	0	5	1	S	1
D	INSTRUCTION MANUALS					
	ERECTION & COMMISSIONING	0	1	3	S	3
	O & M MANUAL	0	1 + 1CD	5 + 1CD	S	2 + 1CD

NOTE: INITIAL SUBMISSION OF DRAWINGS / DOCUMENTS WILL BE IN SOFT FORMAT (PDF ONLY) THROUGH EMAIL FOLLOWED BY SEVEN (07) HARD COPIES.

KPCL- KARNATAKA POWER CORPORATION LIMITED
CONSULTANT -FICHTNER
S SOURCE
CD SOFT COPY

Note:

- Quantity of prints may change during detailed engineering stage based on BHEL / Customer requirement. However the same will be adhered by the bidder without any delivery/commercial implication to BHEL.
- Initial submission of drawings / documents will be in soft format (pdf only) through email followed by Seven (07) hard copies.
- All the drawing documents along with the O&M manual (of all the revisions) are necessarily to be submitted in soft copies in addition to hard copies.
- The date of submission of drawing documents shall be considered as the date of submission of hard and soft copies whichever is later.
- All the drawings shall be prepared on computer auto cad and other documents (like datasheet etc.) on MS office software. Bidder not complying to the requirement shall not be considered. For the execution of the contract regular meeting (generally once in 15 days or as per project requirement) is required. Vendor to come for meeting with the concerned dealing persons as per BHEL or customer (KPCL) requirement in a short notice.
- Bidder to also furnish the auto cad copy of the following documents after award of contract. However any other auto cad copy of any other document as per the insistence of BHEL / customer will also be submitted by the bidder without any delivery/commercial implication to BHEL.
 - P&IDs.
 - GA & FOUNDATION DETAILS OF OXYGEN DOSING SKIDS
 - JUNCTION BOX TERMINATION DRAWINGS



TITLE:

**KARNATAKA POWER CORPORATION LIMITED
1x370 MW KPCL YELAHANKA CCPP
TECHNICAL SPECIFICATION FOR CHEMICAL DOSING SYSTEM
(ANNEXURE-VI)**

SPEC NO: PE-TS-409-154-A001,R01

MASTER DRAWING LIST WITH SCHEDULE OF SUBMISSION

**TITLE:**

**KARNATAKA POWER CORPORATION LIMITED
1x370 MW KPCL YELAHANKA CCPP
TECHNICAL SPECIFICATION FOR CHEMICAL DOSING SYSTEM
(ANNEXURE-VI)**

SPEC NO: PE-TS-409-154-A001,R01

After award of LOI, following minimum drawing/documents shall be submitted by the bidder for BHEL and Customer approval. However any additional drawing/document if found necessary for completion of the engineering, the same shall be submitted by bidder without any commercial & delivery implication to BHEL.

For the Drawings/Documents Distribution & Submission , please refer **Annexure-V**. The submission of soft copy or hard copy of the drawing/document whichever is later will be considered as final date of submission of the drawing/document. The bidder has to submit the revised drawing/document along with the compliance sheet indicating enumerate reply to all BHEL and customer comments or observations. Without compliance sheet the submission of the drawings/documents will not be considered and the delay on this account will be solely on bidder's side only. Bidder to comply with the observations of the BHEL and CUSTOMER without price & delivery implication.

Bidder to note that the drawings to be submitted by bidder in the event of award of contract shall be as per the below given drawing/document list. Bidder to note that any additional drawings/documents requirement during detailed engineering shall be provided by bidder without any technical, commercial and delivery implications to BHEL. Bidder confirmed drawings submission schedule as follows:

- Drawing/documents submission schedule: First submission of basic drawings/ documents – (Please refer MDL for list of basic drawing/documents & submission schedule).
- Every revised submission incorporating comments – within 7 days.

Bidder further confirmed that drawings submitted shall be complete in all respects with revised drawing submitted incorporating all comments. Any incomplete drawing submitted shall be treated as non-submission with delays attributable to bidder's account. For any clarification/ discussion required to complete the drawings, the bidder shall himself depute his personal to BHEL for across the table discussions/ finalizations/ submissions of drawings.

(a) List and schedule of drawings/documents to be submitted after award of contract:-

MDL				
S. NO	BHEL DRG NO	DRG TITLE	No. of weeks for document submission after placing LOI/PO	Document size
1	PE-V0-409-154A-A001	P&I DIAGRAM FOR CHEMICAL DOSING SYSTEM	3	A1
2	PE-V0-409-154A-A002	TECHNICAL DATA SHEET--CHEMICAL DOSING SYSTEM	4	A4
3	PE-V0-409-154A-A003	GA DRAWING & FOUNDATION DETAILS	3	A1
4	PE-V0-409-154A-A004	LOCAL CONTROL PANEL (INCLUDING WIRING DIAGRAM, LOGIC DIAGRAM AND FIELD TERMINATION DETAILS)- CDS	4	A4
5	PE-V0-409-154A-A005	ELECTRICAL LOAD DATA	6	A4
6	PE-V0-409-154A-A006	QAP FOR CHEMICAL DOSING SYSTEM	3	A4
7	PE-V0-409-154A-A007	ERECTION PROCEDURE	6	A4
8	PE-V0-409-154A-A008	ENGINEERING BOQ	10	A4
9	PE-V0-409-154A-A009	O&M MANUAL FOR CHEMICAL DOSING SYSTEM WITH CATALOGUE	20	As applicable

In addition of above following documents shall also be submitted by bidder during detail engineering:-

- Storage instructions
- Bidder to note that drawings/documents submission shall be through web based Document Management System. Bidder would be provided access to the DMS for drawings/documents approval and adequate training for the same. Detailed methodology would be finalized during the kick-off meeting. Bidder to ensure following at their end.
 - Internet explorer version – Minimum Internet Explorer 7
 - Internet speed – 2 mbps (Minimum preferred)
 - Pop ups from our external DMS IP (124.124.36.198) should not be blocked
 - Vendor's internal proxy setting should not block DMS application's link
 - o (<http://124.124.36.198/wrenchwebaccess/login.aspx>)

**TITLE:**

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TECHNICAL SPECIFICATION FOR CHEMICAL DOSING SYSTEM
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SPEC NO: PE-TS-409-154-A001,R01

- DMS user manuals to be used by BHEL PEM vendors for uploading, viewing, revising, commenting and tracking documents on PEM's DMS have been uploaded on PEM internet website (www.bhelpem.com) under the Vendor session.
- For quick access bidder may refer the link <http://bhelpem.com/DMSManuals/DMSManuals.html>
- SManuals/DMSManuals.html



TITLE:

**KARNATAKA POWER CORPORATION LIMITED
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TECHNICAL SPECIFICATION FOR CHEMICAL DOSING SYSTEM
(ANNEXURE-VII)**

SPEC NO: PE-TS-409-154-A001,R01

FORMAT FOR OPERATION AND MAINTENANCE MANUAL



TITLE:
KARNATAKA POWER CORPORATION LIMITED
1x370 MW KPCL YELAHANKA CCPP
TECHNICAL SPECIFICATION FOR CHEMICAL DOSING SYSTEM
(ANNEXURE-VII)

SPEC NO: PE-TS-409-154-A001,R01

FORMAT FOR OPERATION AND MAINTENANCE MANUAL

Project name :
Project number :
Package Name :
PO reference :
Document number :
Revision number :

Sl.no. & Sections	Description	Tick (√)if included in Manual			Remarks
		Yes	No	Not Applicable	
1.	<u>Cover page</u>				
1.1	Project Name				
1.2	Customer/consultant Name				
1.3	Name of Package				
1.4	Supplier details with phone, FAX ,email address , Emergency Contact number				
1.5	Name and sign of prepared by , checked by & approved by				
1.6	Revision history with approval Details				
2.0	<u>Index</u>				
2.1	showing the sections & related page nos All the pages should be numbered section wise				
3.0	<u>Description of Plant/System</u>				
3.1	Description /write up of operating principle of system equipment/ associated sub-systems & accessories/controls system , operating conditions, performance parameters under normal , start up and special cases				
3.2	Equipment list and basic parameter with Tag numbers				
3.3	Data sheets approved by Customer/for information and catalogues provided by original manufacturer				
3.4	Associated other packages and Interface /terminal points				
3.5	P&ID & Process Diagrams				
3.6	GA Layout drawings, As-built drawings , Actual photograph of items/system (Drawings of A2 & bigger sizes are to be attached in the last)				
3.7	Single line/wiring diagrams				
3.8	Control philosophy /control write-ups				
4.0	<u>Commissioning Activities (if not covered in separate document i.e. erection manual, commissioning manual)</u>				
4.1	Pre-Commissioning Checks				
4.2	handling of items at site				
4.3	Storage at site				
4.4	Unpacking & Installation procedure				
5.0	<u>Operation Guidelines for plant personal/user/operator</u>				
5.1	Interlock & Protection logic along with the limiting values of protection settings for the equipment along with brief philosophy behind the logic, drawings etc. to be provided.				



TITLE:

KARNATAKA POWER CORPORATION LIMITED
1x370 MW KPCL YELAHANKA CCPP
TECHNICAL SPECIFICATION FOR CHEMICAL DOSING SYSTEM
(ANNEXURE-VII)

SPEC NO: PE-TS-409-154-A001,R01

5.2	Start up, normal operation and shut down procedure for equipments along with the associated systems in step by step mode. Valve sequence chart, step list, interlocks etc. with Equipment isolating procedures to be mentioned.				
5.3	Do's & Don't of the equipments.				
5.4	Safety precautions to be taken during normal operation. Safety symbols, Emergency instructions on total power failure condition/lubrication failure/any other condition				
5.5	Parameters to be monitored with normal values and limiting values				
5.6	Trouble shooting with causes and remedial measures				
5.7	Routine operational checks, recommended logs & records				
5.8	Changeover schedule if more than one auxiliary for the same purpose is given				
5.9	Painting requirement and schedule				
5.10	Inspection, repair, Testing and calibration procedures				
6.0	<u>Maintenance guidelines for plant personal</u>				
6.1	List of Special Tools and Tackles required for Overhaul/Trouble shooting including special testing equipment required for calibration etc.				
6.2	Stepwise dismantling and re-assembly procedure clearly specifying the tools to be used, checks to be made, records to be maintained, clearances etc. to be mentioned. Tolerances for fitment of various components to be given.				
6.3	Preventive Maintenance & Overhauling schedules linked with running hours/calendar period along with checks to be given				
6.4	Long term maintenance schedules especially for structural, foundations etc.				
6.5	Consumable list along with the estimated quantity required during commissioning, normal running and during maintenance like Preventive Maintenances and Overhaul. Storage/handling requirement of consumables/self-life.				
6.6	List of lubricants with their Indian equivalent, Lubrication Schedule, Quantity required for each equipment for complete replacement is to be given				
6.7	List of vendors & Sub-vendors with their latest addresses, service centres, Telephone Nos., Fax Nos., Mobile Nos., e-mail IDs etc.				
6.8	List of mandatory and recommended spare parts list				
6.9	Tentative Lead time required for ordering of spares from the equipment supplier				
6.10	Guarantee and warranty clauses				
7.0	Statutory and other specific requirements considerations.				
8.0	List of reference documents				
9.0	Binding as per requirement				



TITLE:
KARNATAKA POWER CORPORATION LIMITED
1x370 MW KPCL YELAHANKA CCPP
TECHNICAL SPECIFICATION FOR CHEMICAL DOSING SYSTEM

SPEC NO: PE-TS-409-154-A001

VOLUME: III

SECTION:

REV NO: 01

DATE:

VOL-III

**TITLE:**

KARNATAKA POWER CORPORATION LIMITED
1x370 MW KPCL YELAHANKA CCPP
TECHNICAL SPECIFICATION FOR CHEMICAL DOSING SYSTEM

SPEC NO: PE-TS-409-154-A001

VOLUME: III

SECTION:

REV NO: 01

DATE:

1.0 DRAWINGS/DOCUMENTATION REQUIREMENT ALONG WITH BID.

Bidder to furnish 4 sets of techno-commercial bid including following documents/information **(For Electrical and C&I please refer the respective section of the specification)**.

- Deviation if any in the enclosed Schedule of deviation with cost of withdrawal only with mention of specification clause for which deviation is being asked. (Stamped & Signed)
- Compliance cum confirmation certificate. (Stamped & Signed)
- Un Price Schedule duly filled in. (Stamped & Signed).
- List of tools & tackles, if any, (Stamped & Signed).
- Compliance to Electrical Load data (Stamped & Signed Copy Of Electrical Load data (Annexure-VIII))

Bidder to note that if bidder has taken any deviation from the technical specification requirements, the same shall be clearly mentioned in the bid in the BHEL prescribed format of Schedule of Deviations attached as Volume - III of this technical specification.

In case of no deviation, Bidder to furnish signed and stamped copy of "Schedule of Deviations with cost of withdrawal" stating **"No Deviation"**.

No other technical document is required along with bidder's offer. Any other document submitted by bidder shall not be evaluated by BHEL and shall be considered as withdrawn.

Bidder to note that any un-declared deviation mentioned in bidder offer other than specified in the scheduled of Deviations shall be considered as null and void.



TITLE:
KARNATAKA POWER CORPORATION LIMITED
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TECHNICAL SPECIFICATION FOR CHEMICAL DOSING SYSTEM

SPEC NO: PE-TS-409-154-A001

VOLUME: III

SECTION:

REV NO: 01

DATE:

COMPLIANCE CUM CONFIRMATION CERTIFICATE

The bidder shall confirm compliance with following by signing / stamping this compliance certificate (every sheet) 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, other than those mentioned under "exclusion and those resolved as per 'Schedule of Deviations', with regard to same.
- b. There are no other deviations w.r.t. specifications 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 approval & 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. This is within the contracted price without any extra implications to BHEL after award of the contract.
- d. All drawings/ data-sheets / calculations etc. submitted along with the offer shall not be taken cognizance off.
- e. The offered materials shall be either equivalent or superior to those specified in the specification & shall meet the specified / intended duty requirements. In case the material specified in the specifications is not compatible for intended duty requirements then same shall be resolved by the bidder with BHEL during the pre-bid discussions, otherwise BHEL / Customer's decision shall be binding on the bidder whenever the deficiency is pointed out.

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' & prices for same included in the base price itself.
- g. All sub vendors shall be subject to BHEL / CUSTOMER approval in the event of order.
- h. Guarantee for plant/equipment shall be as per relevant clause of GCC / SCC / Other Commercial Terms & Conditions
- i. In the event of order, all the material required for completing the job at site shall be supplied by the bidder within the ordered price even if the same are additional to approved billing break up, approved drawing or approved Bill of quantities within the scope of work as tender specification. This clause will apply in case during site commissioning, additional requirements emerges due to customer and / or consultant's comments. No extra claims shall be put on this account
- j. Schedule of drawings submissions, comment incorporations & approval shall be as stipulated in the specifications. The successful bidder shall depute his design personnel to BHEL's / Customer's / Consultant's office for across the table resolution of issues and to get documents approved in the stipulated time.
- k. As built drawings shall be submitted as and when required during the project execution.
- l. The bidder has not tempered with this compliance cum confirmation certificate and if at any stage any tempering in the signed copy of this document is noticed then same shall be treated as breach of contract and suitable actions shall be taken against the bidder.
- m. Successful bidder shall furnish detailed erection manual for each of the equipment supplied under this contract at least 3 months before the scheduled erection of the concerned equipment / component or along with supply of concerned equipment / component whichever is earlier.
- n. Document approval by customer under Approval category or information category shall not absolve the vendor of their contractual obligations of completing the work as per specification requirement. Any deviation from specified requirement shall be reported by the vendor in writing and require written approval. Unless any change in specified requirement has been brought out by the vendor during detail engineering in writing while submitting the document to customer for approval, approved document (with implicit deviation) will not be cited as a reason for not following the specification requirement.
- o. In case vendor submits revised drawing after approval of the corresponding drawing, any delay in approval of revised drawing shall be to vendor's account and shall not be used as a reason for extension in contract completion.

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



TITLE:
KARNATAKA POWER CORPORATION LIMITED
1x370 MW KPCL YELAHANKA CCPP
TECHNICAL SPECIFICATION FOR CHEMICAL DOSING SYSTEM

SPEC NO: PE-TS-409-154-A001
VOLUME: III
SECTION:
REV NO: 01 DATE:

PRE-BID CLARIFICATION SCHEDULE

S. NO.	SECTION/CLAUSE/PAGE NO.	STATEMENT OF THE REFERRED CLAUSE	CLARIFICATION REQUIRED

The bidder hereby clarifies that above mentioned are the only clarifications required on the technical specification for the subject package.

Signature: _____

Name: _____

Designation: _____

Company: _____

Date: _____

Company Seal



TITLE:
KARNATAKA POWER CORPORATION LIMITED
1x370 MW KPCL YELAHANKA CCPP
TECHNICAL SPECIFICATION FOR CHEMICAL DOSING SYSTEM

SPEC NO: PE-TS-409-154-A001

VOLUME: III

SECTION:

REV NO: 01

DATE:

DEVIATION SHEET (COST OF WITHDRAWAL)

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
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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 discrepancies in the nature of impact (positive/ negative), positive will be considered for evaluation and negative for ordering.

Doc No: PE-PF-409-154-A001

Rev No: 1

Date of issue 07.12.2016

SUGGESTED PRICE FORMAT

NAME OF PROJECT:		1x370 MW KPCL YELAHANKA CCPP		
NAME OF PACKAGE:		CHEMICAL DOSING SYSTEM		
TECHNICAL SPECIFICATION:		PE-TS-409-154-A001,R01		
S. No.	Description	UNIT	QTY	
1.0	Total lump sum firm price for design, engineering, manufacture, fabrication, assembly, supply, inspection / testing at vendor's & sub-vendor's works, painting, mandatory spares , startup and commissioning spares, special tools and tackles (as applicable), forwarding, proper packing, shipment and delivery at site, preparation and submission of drawing /documents & equipment / system guarantee etc. inclusive of all prevailing taxes, duties and other levies for the package specified above for above mentioned project to the end customer complete with all accessories for the total scope defined as per BHEL NIT & tender technical specification no. as specified above, amendment & agreements till placement of order.	Set	1	
2.0	MAJOR BREAK-UP OF PRICES GIVEN IN 1.0 ABOVE.			
2.1	Total lump sum firm price for design, engineering, manufacture, fabrication, assembly, supply, inspection / testing at vendor's & sub-vendor's works, painting, startup and commissioning spares, special tools and tackles (as applicable), forwarding, proper packing, shipment and delivery at site, preparation and submission of drawing /documents & equipment / system guarantee etc. inclusive of all prevailing taxes, duties and other levies for the package specified above for above mentioned project to the end customer complete with all accessories for the total scope defined as per BHEL NIT & tender technical specification no. as specified above, amendment & agreements till placement of order.	Set	1	
2.2	Total lumpsum on FOR basis inclusive of all prevailing taxes, duties and other levies for SUPPLY OF MANDATORY SPARES (as per ANNEXURE- I) and as per BHEL NIT & tender technical specification as specified above, amendment & agreements till placement of order.	Lot	1	
Particulars of bidder / authorised representative				
Name	Designation	Signature	Date	Company Seal

Doc No: PE-PF-409-154-A001
 Rev No: 1
 Date of issue 07.12.2016

SUGGESTED PRICE FORMAT			
NAME OF PROJECT: 1x370 MW KPCL YELAHANKA CCPP			
NAME OF PACKAGE:CHEMICAL DOSING SYSTEM: LIST OF MANDATORY SPARES			
TECHNICAL SPECIFICATION: PE-TS-409-154-A001 R01			
S. N.	Description	QTY	UNIT
A	Dosing Pumps (For each type of pump under each system.)		
1.0	Plunger / Diaphragm	1	Set
2.0	Pump bearings	1	Set
3.0	"O" Rings / Gland packing	1	Set
4.0	Ball valves / Globe valves	1	No.
5.0	Relief valves	2	Nos.
6.0	Oil and grease seals	1	No.
B	Motorised Agitator (For each type of agitator under each system.)		
1.0	Impeller / Propeller with shaft	1	No.
Note: Mandatory spares listed above is bare minimum requirement. In case any additional mandatory spares requirement is covered elsewhere in the tender technical specification, same shall be deemed to have been covered in bidders scope of supply.			
Particulars of bidder / authorised representative			
Name	Designation	Signature & Company Seal	Date



TITLE:
KARNATAKA POWER CORPORATION LIMITED
1x370 MW KPCL YELAHANKA CCPP
TECHNICAL SPECIFICATION FOR CHEMICAL DOSING SYSTEM

SPEC NO: PE-TS-409-154-A001

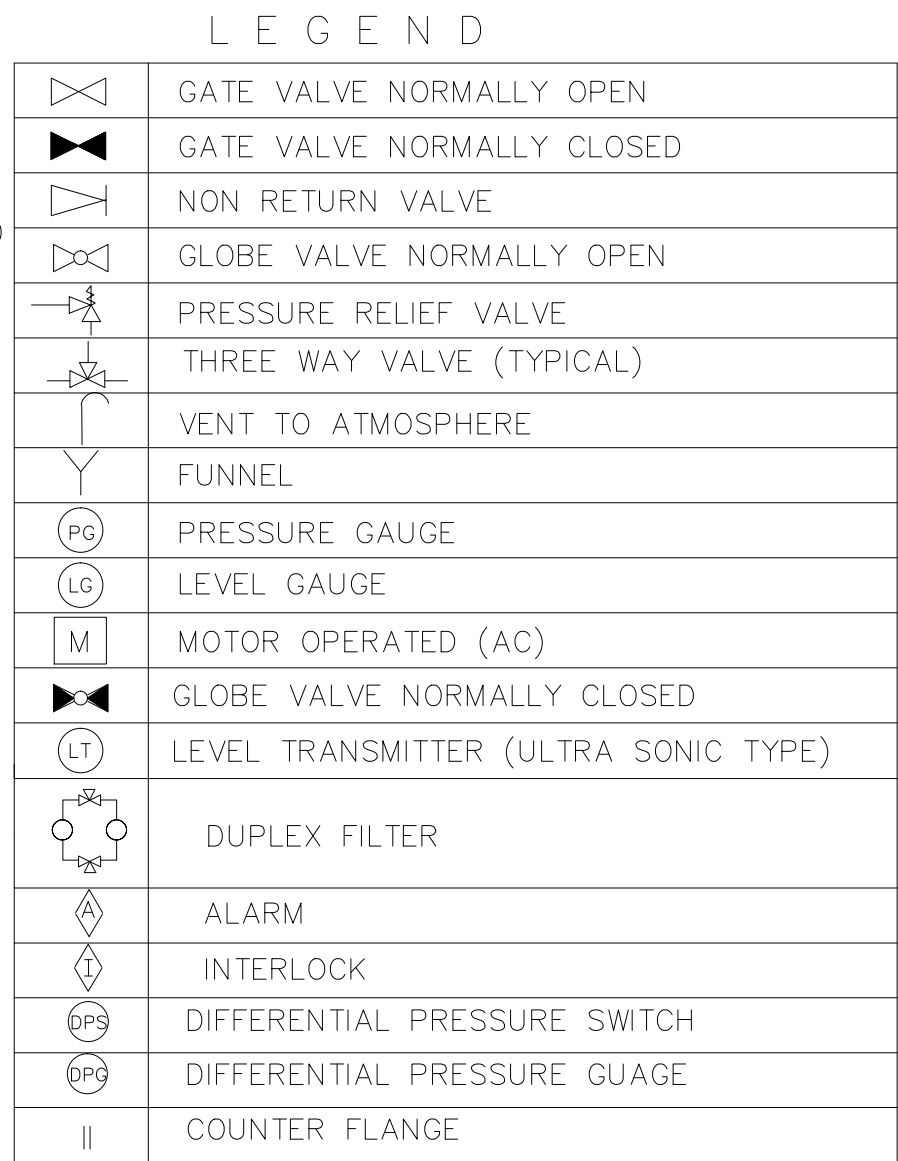
VOLUME: III

SECTION:

REV NO: 01

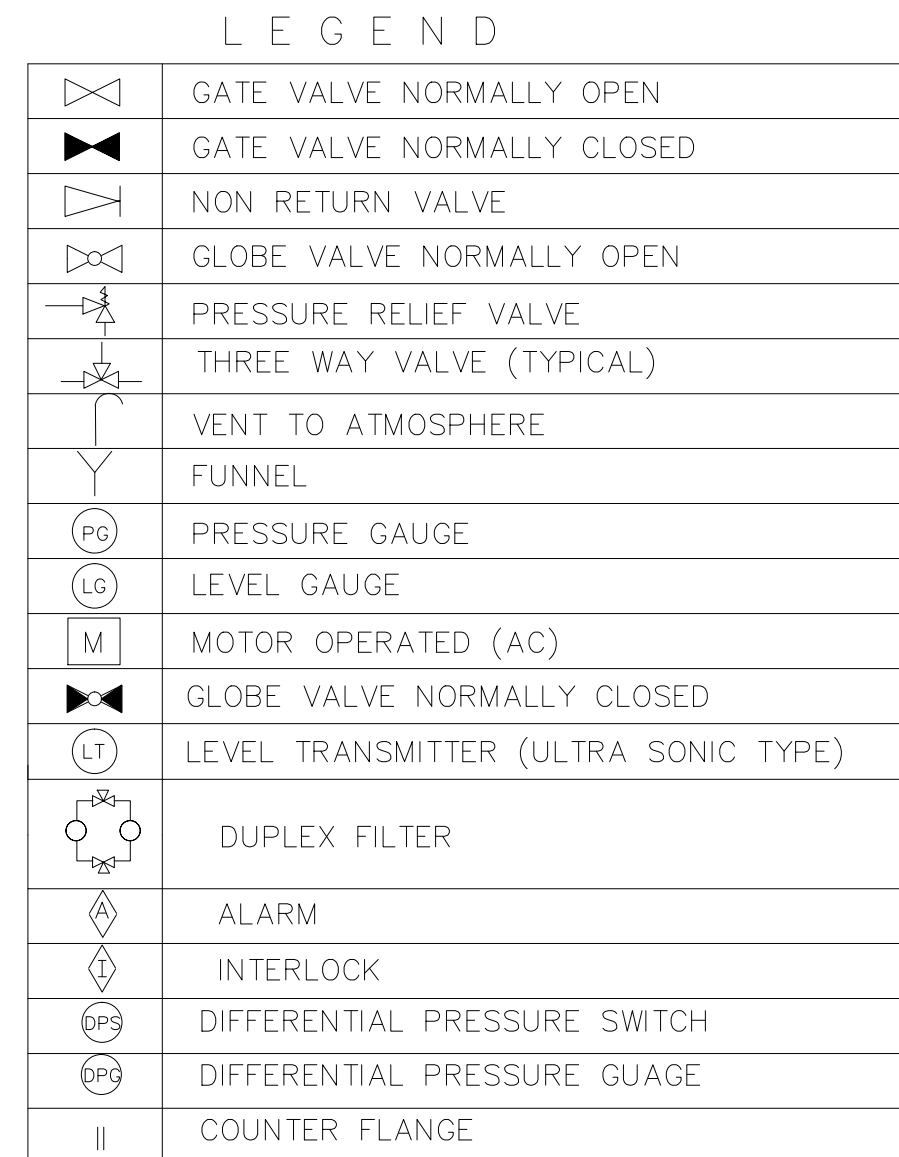
DATE:

DRAWINGS



- NOTES: —
1. DOSING SYSTEM SHALL BE SKID MOUNTED.
 2. PIPE SIZE: 25 Nb—33.4X3.38 MM, 15 Nb—21.3X2.77 MM.
 3. ALL DRAINS SHALL BE CONNECTED AT ONE POINT ON SKID.
(EXCEPT LEVEL GAUGE LINE).
 4. FOR CAPACITY OF THE TANKS AND PUMPS PLEASE REFER
DATASHEET —A
 5. ONE NO. OF HAND PUMP SHALL BE SUPPLIED WITH THE SKID.
 6. THE SKID SHOWN IN THIS DRAWING IS FOR ONE UNIT

		OWNER:		KARNATAKA POWER CORPORATION LIMITED					
		1x370 MW YELAHANKA COMBINED CYCLE POWER PLANT							
		OWNER'S CONSULTANT:		FICHTNER Consulting Engineers (India) Private Limited, Chennai, Bengaluru.					
		EPC CONTRACTOR:		BHARAT HEAVY ELECTRICALS LTD POWER SECTOR PROJECT ENGINEERING MANAGEMENT NOIDA					
UDB NO. 409 STATUS CONTRACT DISTRIBUTION				COPY RIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED it must not be used directly or indirectly in any way detrimental to the interest of the company.					
D	REV.	DATE	ALTD	CHD	APPD	DEPT CODE M	NAME VVK CHD APPD	SIGN	DATE
TITLE P & I D FOR HYDRAZINE DOSING SYSTEM									
						DEPT. SIGN	SCALE: 1:100 	DRAWING NO. PE-DG-409-15A-A001	
14				15				SHEET 01 OF 01	REV. 01
PAGE 14 OF 15									



1. DOSING SYSTEM SHALL BE SKID MOUNTED.
2. PIPE SIZE: 25 Nb-33.4X3.38 MM, 15 Nb-21.3X2.77 MM.
3. ALL DRAINS SHALL BE CONNECTED AT ONE POINT ON SKID.
(EXCEPT LEVEL GAUGE LINE).
4. FOR CAPACITY OF THE TANKS AND PUMPS PLEASE REFER
DATASHEET -A
5. ONE NO. OF HAND PUMP SHALL BE SUPPLIED WITH THE SKID.
6. THE SKID SHOWN IN THIS DRAWING IS FOR ONE UNIT

DV:DOSING VENDOR SCOPE

COMPUTER FILE NAME: AMMONIA DOSING.DWG

LEGEND

	GATE VALVE NORMALLY OPEN
	GATE VALVE NORMALLY CLOSED
	GLOBE VALVE NORMALLY OPEN
	VENT TO ATMOSPHERE
	FUNNEL
	LEVEL GAUGE
	MOTOR OPERATED (AC)
	GLOBE VALVE NORMALLY CLOSED
	LEVEL TRANSMITTER (ULTRA SONIC TYPE)
	ALARM
	INTERLOCK
	COUNTER FLANGE

NOTES: —

1. DOSING SYSTEM SHALL BE SKID MOUNTED.
2. PIPE SIZE: 25 Nb–33.4X3.38 MM, 15 Nb–21.3X2.77 MM.
3. ALL DRAINS SHALL BE CONNECTED AT ONE POINT ON SKID. (EXCEPT LEVEL GAUGE LINE).
4. FOR CAPACITY OF THE TANK PLEASE REFER DATASHEET — A.
5. THE SKID SHOWN IN THIS DRAWING IS FOR ONE UNIT,



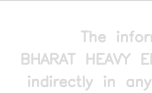
OWNER:
KARNATAKA POWER CORPORATION LIMITED
1x370 MW YELAHANKA COMBINED CYCLE POWER PLANT

FICHTNER

OWNER'S CONSULTANT:
FICHTNER Consulting Engineers (India) Private Limited,
Chennai, Bengaluru.



BPC CONTRACTOR:
BHARAT HEAVY ELECTRICALS LTD
POWER SECTOR
PROJECT ENGINEERING MANAGEMENT
Noida



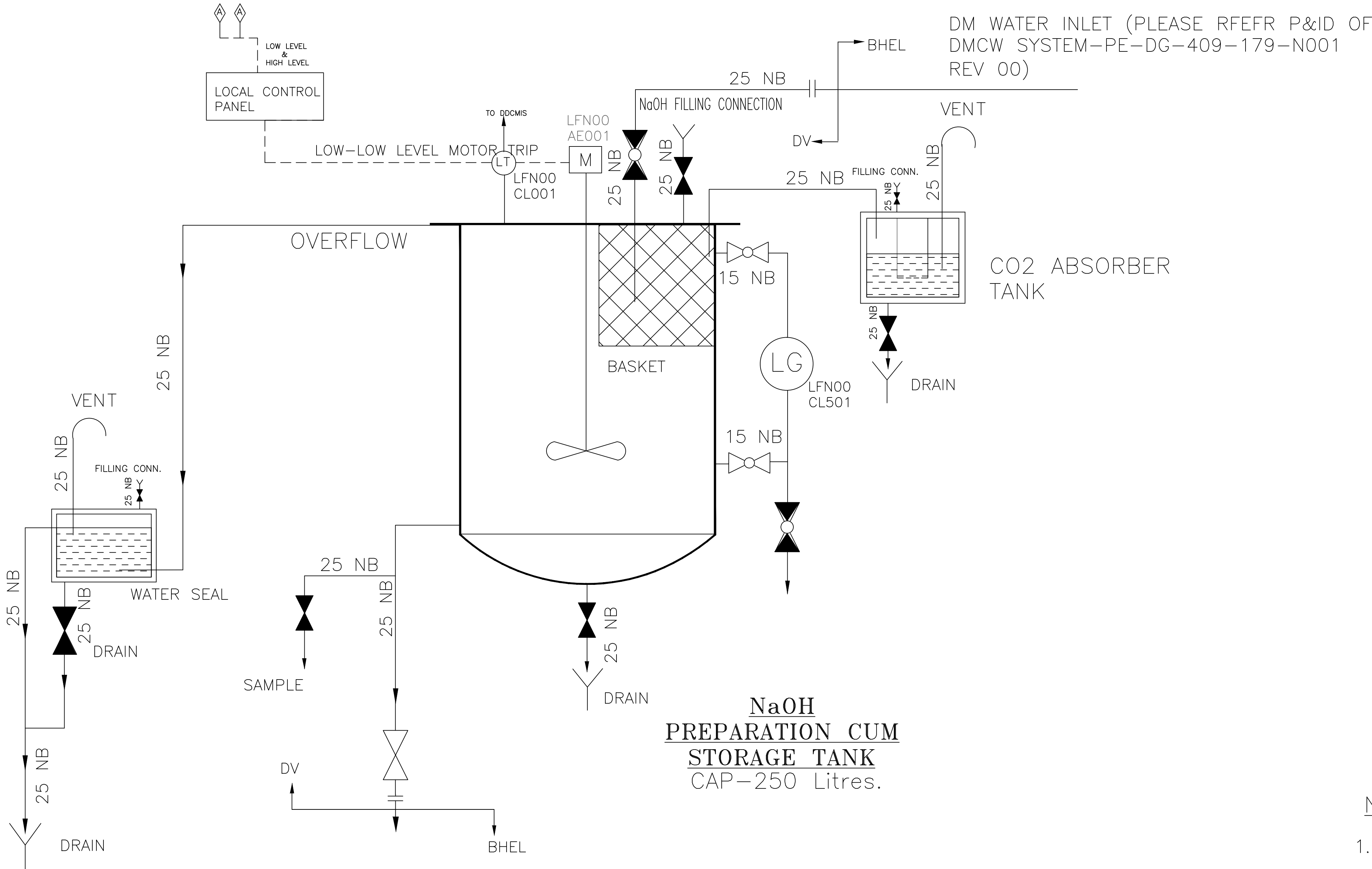
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TITLE
P & I D FOR NaOH DOSING SYSTEM

DEPT. SCALE 1:100 DRAWING NO.
PE-DG-409-154-A003

SHEET 01 OF 01 REV. 01

SIZE-A0



TO DMCW TANK
(P&ID OF DMCW SYSTEM-PE-DG-409-179-N001)

DV: DOSING VENDOR SCOPE

