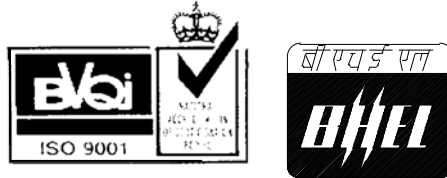


3 X 660 MW NTPC NORTH KARANPURA STPP


TECHNICAL SPECIFICATION FOR SELF CLEANING STRAINERS (SCS)

Specification No. : PE-TS- 405-165-N003(REV. 0)

VOLUME -IIB



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

	TITLE : TECHNICAL SPECIFICATION FOR SELF CLEANING STRAINERS (SCS)	SPEC. NO. PE-TS- 405-165-N003	
	PREAMBLE	VOLUME : II B	
		REV. NO. 0	DATE :15.07.2014
		SHEET1 OF 2	

1.0 The tender document contains three (3) volumes. The bidder shall meet the requirements of all the three volumes.

1.1 **Volume -I CONDITIONS OF CONTRACT**

This consists of four parts as below :

Volume - I A : This part contains instructions to bidders for making bids to BHEL.

Volume - I B : This part contains general commercial conditions of the tender and include provision that vendor shall be responsible for the quality of item supplied by their sub-vendors.

Volume - I C : This part contains special conditions of contract.

Volume - I D : This part contains commercial conditions for erection and commissioning site work, as applicable.

1.2 **Volume - II TECHNICAL SPECIFICATIONS**

Technical requirements are stipulated in Volume II which comprises of :

Volume - II A : General Technical Conditions

Volume - II B : Technical specification including drawings, if any

1.2.1 **Volume - II B :**

This volume is sub-divided into following sections:

Section - A : This section outlines the scope of enquiry.

Section - B : This section provides "Project Information"

Section - C : This section indicates technical requirements specific to the contract, not covered in Section-D.

Section - D : This section comprises of standard technical specifications of equipments complete with data sheet A, B & C.

Data sheet-A specifies data and other requirements pertaining to the equipment.

Data sheet - B specifies data to be filled by the bidder (Data Sheet B is contained in Volume - III)

Data sheet - C indicates data documents to be furnished after the award of contract as per agreed schedule by the vendor (as applicable).



TITLE : TECHNICAL SPECIFICATION
FOR
SELF CLEANING STRAINERS (SCS)

PREAMBLE

SPEC. NO. PE-TS- 405-165-N003

VOLUME : II B

REV. NO. 0 DATE :15.07.2014

SHEET 2 OF 2

1.2.2 **Volume - III TECHNICAL SCHEDULES**

- 1.0 This volume contains technical schedules and Data Sheets - B, which are to be duly filled by the bidder and the same shall be furnished with the technical bid as per instructions given in Document No.PES-100-901 in Volume-III.
- 2.0 The requirements mentioned in Section C/Data Sheets-A of Section-D shall prevail and govern in case of conflict between the same and the corresponding requirements mentioned in the descriptive portion in Section -D.



**TITLE : TECHNICAL SPECIFICATION
FOR
SELF CLEANING STRAINERS (SCS)**

SPEC. NO. PE-TS-405-165-N003

VOLUME : II B

SECTION : A

REV. NO. 0

DATE :15.07.2014

SHEET 1 of 1

INDEX

SECTION	TITLE
A	SCOPE OF ENQUIRY
B	PROJECT INFORMATION
C	SPECIFIC REQUIREMENTS
C1	SPECIFIC TECHNICAL REQUIREMENTS FOR SELF CLEANING STRAINERS.
C2	SPECIFIC TECHNICAL REQUIREMENTS (ELECTRICAL)
C3	SPECIFIC TECHNICAL REQUIREMENTS (C&I)
D	STANDARD TECH. SPECIFICATIONS
D1	SELF CLEANING STRAINER <ul style="list-style-type: none">◆ STANDARD TECHNICAL SPEC.NO. PE-TS-999-165-N002◆ DATA SHEET-A◆ QUALITY PLAN
D2	ELECTRICAL SYSTEMS
D3	CONTROL & INSTRUMENTATION SYSTEMS



**TITLE : TECHNICAL SPECIFICATION
FOR
SELF CLEANING STRAINERS (SCS)**

SPEC. NO. PE-TS-405-165-N003

VOLUME : II B

SECTION : A

REV. NO. 0

DATE :15.07.2014


SHEET

1

of

1

**SECTION - A
SCOPE OF ENQUIRY**

	TITLE : TECHNICAL SPECIFICATION FOR SELF CLEANING STRAINERS (SCS)	SPEC. NO. PE-TS- 405-165-N003	
	PREAMBLE	VOLUME : II B	
		REV. NO. 0	DATE :15.07.2014
		SHEET1 OF 2	

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TITLE : TECHNICAL SPECIFICATION
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SELF CLEANING STRAINERS (SCS)

PREAMBLE

SPEC. NO. PE-TS- 405-165-N003

VOLUME : II B

REV. NO. 0 DATE :15.07.2014

SHEET 2 OF 2

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**TITLE : TECHNICAL SPECIFICATION
FOR
SELF CLEANING STRAINERS (SCS)**

SPEC. NO. PE-TS-405-165-N003

VOLUME : II B

SECTION : A

REV. NO. 0

DATE :15.07.2014

SHEET 1 of 1

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TITLE : TECHNICAL SPECIFICATION
FOR
SELF CLEANING STRAINERS (SCS)

SPEC. NO. PE-TS-405-165-N003

VOLUME : II B

SECTION : A

REV. NO. 0

DATE :15.07.2014

SHEET

1

of

1

SECTION - A
SCOPE OF ENQUIRY



**TITLE : TECHNICAL SPECIFICATION
FOR
SELF CLEANING STRAINERS (SCS)**

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VOLUME : II B

SECTION : A

REV. NO. 0

DATE :15.07.2014

SHEET 1 of 2

1.00.0 SCOPE

This enquiry covers the design, manufacture, assembly, inspection and testing at manufacturer's and/or his sub-contractors works properly packed for delivery of the items as follows:

1.01.0 Self Cleaning Strainers :

Self Cleaning Strainers (SCS) complete with all accessories as per the requirements specified in different sections of this specification for 3X660 MW NTPC NORTH KARANPURA STPP.

The bidder's scope also includes installation checks, commissioning, trial runs & PG Testing at site of SCS.

1.01.1 The bids shall be evaluated as per NIT.

2.00.00 GENERAL TECHNICAL INSTRUCTIONS:

2.01.00 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 standard of design, engineering and workmanship, and shall be capable of performing the required duties in a manner acceptable to Engineer/ Owner, who will interpret the meaning of drawing and specifications, and shall be entitled to reject any component or material, which in his judgement is not in full accordance herewith.

2.02.00 The omission of specific reference to any component/ accessory necessary for the proper performance of the equipments shall not relieve the bidder of the responsibility of providing such facilities to complete the supply of the equipments at quoted prices.

2.03.00 In case of any deviation from this Technical specification (Vol. IIB) and General Technical Conditions (Vol. IIC), the same shall be indicated in the schedule of deviations enclosed in Volume-III, Part-A. In the absence of duly filled schedules it will be assumed that the bid strictly conforms to the specification.

2.04.00 BHEL's/ Customer's representatives shall be given full access to the shop in which the equipments are being manufactured or tested and all test records shall be made available to him.

2.05.00 The equipments covered under this specification shall not be despatched unless the same have been finally inspected, accepted and shipping release issued by BHEL/ Customer

2.06.00 Un-priced copy of price bid shall be furnished alongwith the technical bid.



**TITLE : TECHNICAL SPECIFICATION
FOR
SELF CLEANING STRAINERS (SCS)**

SPEC. NO. PE-TS-405-165-N003

VOLUME : II B

SECTION : C

REV. NO. 0

DATE :15.07.2014

SHEET

1

of

1

SECTION - B


PROJECT INFORMATION


SUB-SECTION-I-B


PROJECT INFORMATION

**NORTH KARANPURA STPP
(3 X 660 MW)
EPC PACKAGE**

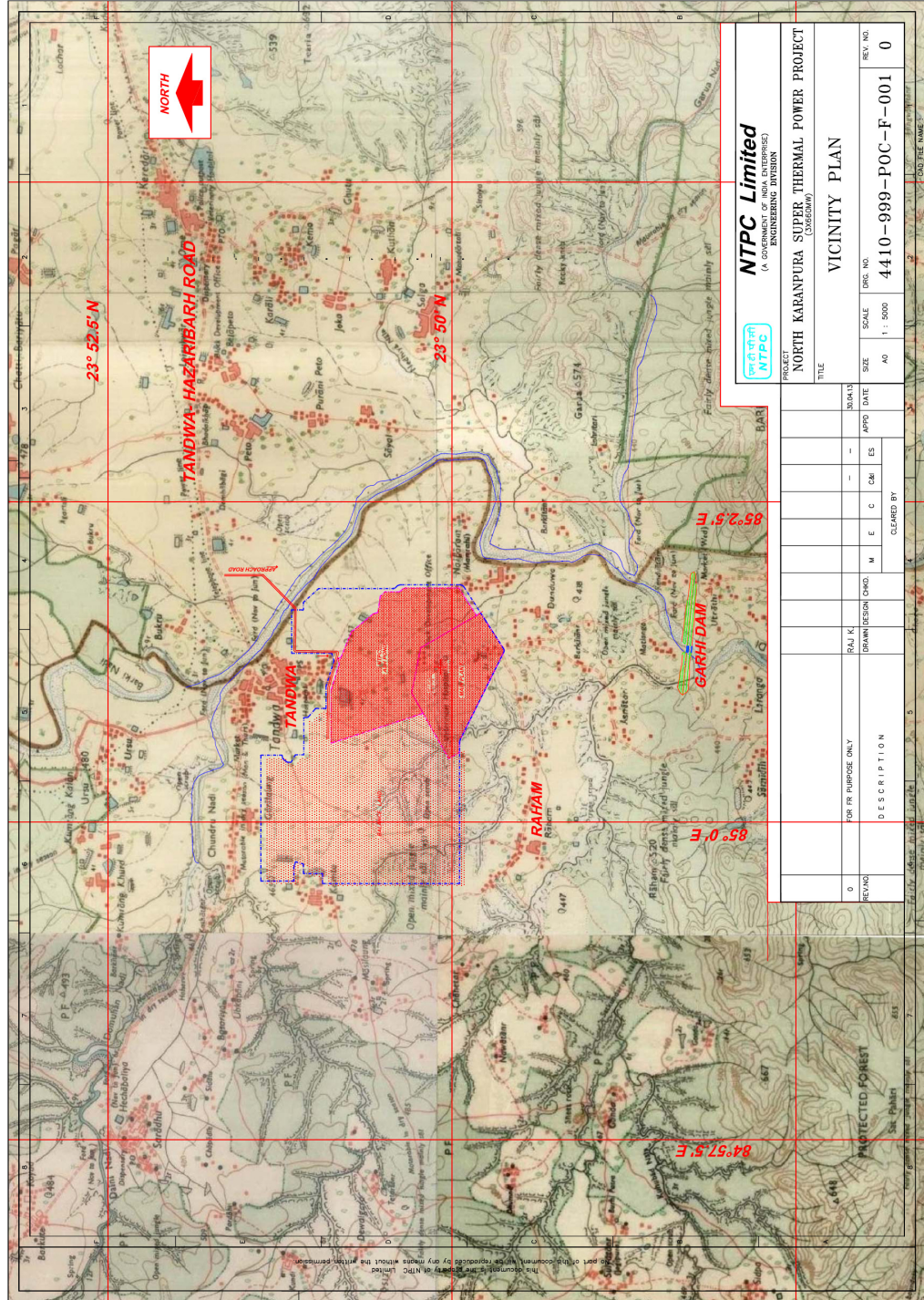
**TECHNICAL SPECIFICATION
SECTION-VI, PART-A
BID DOC NO: CS-4410-001-2**


CLAUSE NO.	PROJECT INFORMATION												
1.00.00	<p>BACKGROUND</p> <p>North Karanpura Super Thermal Power Project (3x660 MW), a pit head coal based thermal power project, is located in Hazaribagh and Chatra districts of Jharkhand State. Basic inputs i.e. coal, water and land have already been tied up. The project is proposed for the States & Union Territories of Northern, Western and Eastern Regions and the State of Jharkhand.</p> <p>The capacity of the project is 1980 MW comprising of three (3) units of 660 MW each.</p>												
1.01.00	<p>Location and Approach</p> <p>The power project is proposed to be located near Tandwa town in Chatra districts in the state of Jharkhand on Hazaribagh-Chatra State highway at a distance of about 50 kms from Hazaribagh city. The nearest commercial airport is Ranchi at a distance of 150 kms from project site. The nearest railhead Khalari Railway Station on Ranchi-Garhwa section of Eastern Railways is about 40 kms from project site. Major rail/road distances from the project site are as under:</p> <table border="1" data-bbox="395 813 1190 958"> <thead> <tr> <th><u>City</u></th> <th></th> <th><u>Distance Approx. (kms)</u></th> </tr> </thead> <tbody> <tr> <td>Ranchi</td> <td>:</td> <td>150</td> </tr> <tr> <td>Khalari</td> <td>:</td> <td>40</td> </tr> </tbody> </table> <p>The site is located near Tandwa town having latitude and longitude of about 23⁰ 50' N to 23⁰ 52' N and 84⁰ 59' E to 85⁰ 2' E respectively. The Vicinity Plan of the project is placed at Annexure-I.</p> <p>Further to the information given in this sub-section, Bidders are also advised to visit the project site and collect data on local site conditions.</p>				<u>City</u>		<u>Distance Approx. (kms)</u>	Ranchi	:	150	Khalari	:	40
<u>City</u>		<u>Distance Approx. (kms)</u>											
Ranchi	:	150											
Khalari	:	40											
1.02.00	<p>Land</p> <p>About 2245 acres of land is being acquired for the project. About 1500 acres of land is under possession/legal possession and out of 1500 acres, about 890 acres of land is to be used for plant, ash dyke and initial enabling township. No additional land is envisaged to be acquired in plant area. About 15 acres of land is envisaged to be acquired in Hazaribagh city for Township. Commissioner, Chatra vide dated 25.05.1999 and 14.06.2000 has given in-principle clearance for NKSTPP.</p>												
1.03.00	<p>Water</p> <p>Make up water available for this project would be about 22 cusec and will be arranged by constructing a dam/reservoir across river Garhi.</p>												
1.04.00	<p>Fuel (Coal)</p>												
1.04.01	<p>Coal Requirement, Availability and Linkage</p> <p>Coal requirement for the project is estimated as 10.6 Million Tonne/Annum (MTPA), considering a GCV of 3800 kcal/kg. Ministry of Coal vide letter dated 21.10.99 accorded in-principle coal linkage of 10.00 MTPA subject to ratification by Standing Linkage Committee-Long Term (SLC (LT)), of MOC. SLC (LT) in its meeting held on 15.12.2000 firmed up the coal linkage of 10.24 MTPA for the project. Subsequently, the coal linkage was withdrawn by SLC (LT) in its meeting held on 22/23.10.08.</p>												
<p>NORTH KARANPURA STPP (3 X 660 MW) EPC PACKAGE</p>		<p>TECHNICAL SPECIFICATION SECTION – VI, PART-A BID DOC. NO.:CS-4410-001-2</p>	<p>SUB-SECTION-IB PROJECT INFORMATION</p>	<p>PAGE 1 OF 10</p>									

CLAUSE NO.	PROJECT INFORMATION			
1.04.02	<p>Cabinet Committee on Investment (GOI) in its meeting on 20.02.13 decided in-principle to restore the original coal linkage granted to NKSTPP (i.e. from Magadh Coal Block) with the stipulation that the coal supply will commence during the 13th Five Year Plan. MOC vide letter dated 09.05.2013 restored the coal linkage with the stipulation that the coal supply will commence during the 13th five year plan.</p> <p>Coal Transportation</p> <p>Coal from Magadh block of North Karanpura Coalfields is proposed to be transported to the project site through conveyor belt system. One external coal handling plant and one internal coal handling plant are envisaged.</p>			
1.05.00	<p>Meteorological Data</p> <p>Important meteorological data from nearest observatory at Hazaribag is placed at Annexure-II.</p>			
1.06.00	<p>Plant Water Scheme</p> <p>The Plant water scheme is described below.</p>			
1.06.01	<p>Condenser Cooling System</p> <p>It is proposed to adopt Air Cooled Condenser for the project.</p>			
1.06.02	<p>Equipment Cooling Water (ECW) System (Unit Auxiliaries)</p> <p>All plant auxiliaries shall be cooled by De-mineralized water (DM) in a closed circuit. The primary circuit DM water shall be cooled through heat exchangers by auxiliary cooling water system. The hot secondary circuit cooling water shall be cooled in the cooling towers and shall be returned back to the system.</p>			
1.06.03	<p>Ash Water System</p> <p>It is proposed to have HCSD (High concentration Slurry Disposal) system for combined fly ash and bottom ash. No recirculation of ash water from ash disposal area is envisaged.</p>			
1.06.04	<p>Other Miscellaneous Water Systems</p> <p>(a) Raw water shall be used for meeting the Fly ash and bottom ash system requirement etc.</p> <p>(b) The service water shall be taken from clarified water tank of Pretreatment plant. Service water (wash water) collected from various areas shall be treated using oil water separators, tube settlers, coal settling pits etc. as per requirement and treated water from liquid effluent treatment plant shall be recycled back to the service water system for re-use.</p> <p>(c) The drinking water requirement of the plant shall be provided from water treatment plant.</p>			
<p>NORTH KARANPURA STPP (3 X 660 MW) EPC PACKAGE</p>		<p>TECHNICAL SPECIFICATION SECTION – VI, PART-A BID DOC. NO.:CS-4410-001-2</p>	<p>SUB-SECTION-IB PROJECT INFORMATION</p>	<p>PAGE 2 OF 10</p>

CLAUSE NO.	PROJECT INFORMATION			
1.07.00	<p>(d) Steam Cycle make-up water, makeup to the primary circuit of ECW (unit auxiliaries) system, boiler fill water and makeup to the hydrogen generation plant shall be provided from Demineralising plant.</p> <p>(e) The quality of Raw water is enclosed with this sub-section as Annexure-III.</p> <p>Criteria for Earthquake Resistant Design of Structures and Equipment</p> <p>All power plant structures and equipment, including plant auxiliary structures and equipment shall be designed for seismic forces as given in the Part - B of this section.</p>			
1.08.00	<p>Criteria for Wind Resistant Design of Structures and Equipment</p> <p>All structures and equipment of the power plant, including plant auxiliary structures and equipment, shall be designed for wind forces as given as given in Part B of this section.</p>			
<p>NORTH KARANPURA STPP (3 X 660 MW) EPC PACKAGE</p>	<p>TECHNICAL SPECIFICATION SECTION – VI, PART-A BID DOC. NO.:CS-4410-001-2</p>	<p>SUB-SECTION-IB PROJECT INFORMATION</p>	<p>PAGE 3 OF 10</p>	

VICINITY PLAN



 NTPC Limited <small>(A COMPANY OF NTPC)</small> <small>ENGINEERING DIVISION</small>	
PROJECT: NORTH KARANPURA SUPER THERMAL POWER PROJECT <small>(3000MW)</small>	
TITLE: VICINITY PLAN	
NO. FOR PURPOSE ONLY	NO. FOR DATE
0	-
DESCRIPTION	SCALE
	1: 5000
	REV. NO.
	4410-999-POC-F-001
	0




CLIMATOLOGICAL TABLE

CLIMATOLOGICAL TABLE

1951 से 1980 तक के अवधि पर आधारित
BASED ON OBSERVATIONS FROM 1951 TO 1980

STATION : Hazaribagh
स्थान : हज़ारिबाग
LAT 23°59' N LONG 85°22' E
सही तल मध्य से ऊँचाई
HEIGHT ABOVE M. S. L. 611 METRES

माह	वायु तापमान				वायु आर्द्रता				वायु चाल				वर्षा			
	शुष्क बल्ब ताप	तम ताप	दैनिक औसत ताप	सर्वोच्च ताप	शुष्क बल्ब आर्द्रता	सापेक्ष आर्द्रता	वाष्प दाब	समस्त वाष्प	निम्न वेग	मासिक वेग	दिवसीय संख्या	वर्षा के दिनों की संख्या	सर्वोच्च वेग	सर्वोच्च दिशा	सर्वोच्च वेग	सर्वोच्च दिशा
JAN	14.7	9.3	26.7	4.6	30.6	82	10.4	1.4	23.5	1.7	113.0	0.0	86.1	06	6.2	
FEB	15.9	12.0	30.5	6.9	33.6	49	10.4	1.8	18.2	1.4	1919	0.0	63.5	23	7.3	
MAR	17.9	16.6	35.6	11.4	38.9	39	10.4	1.4	18.4	1.7	1907	0.0	44.2	20	7.9	
APR	23.4	21.3	39.3	16.4	41.7	29	10.2	1.9	17.0	1.4	1905	0.0	60.5	22	6.6	
MAY	28.6	24.0	41.5	19.3	43.9	36	13.3	1.8	43.4	2.9	1952	0.0	84.1	27	9.1	
JUN	30.7	24.1	40.1	21.0	46.6	43	18.1	2.5	177.1	9.2	1976	0.5	249.2	24	8.7	
JUL	28.4	23.0	35.2	21.4	39.6	67	25.0	5.3	310.0	16.2	1911	693.2	99.8	06	7.9	
AUG	26.8	22.7	31.5	21.3	34.2	86	28.2	6.5	320.1	16.2	1930	706.1	83.8	17	7.6	
SEP	25.2	22.2	31.5	20.4	33.3	88	28.3	6.4	260.9	11.6	1943	1943	180.1	17	7.6	
OCT	23.1	22.2	31.5	20.4	33.3	84	26.8	5.1	80.6	4.1	1883	40.7	167.4	28	7.3	
NOV	20.2	18.9	31.3	14.3	34.0	73	21.4	2.4	2.4	1.2	1966	378.6	0.0	149.4	24	5.2
DEC	15.7	9.3	26.2	5.1	29.4	68	14.3	2.9	5.5	0.4	1963	160.0	0.0	95.0	08	4.8
ANNUAL MEAN	23.3	18.1	41.9	3.8	46.6	63	16.2	3.0	1277.9	67.2	2146.0	739.6	249.2	7.2		
वर्षों की संख्या	28	27	27	28	83	55	17.7	3.3	29	29	1893	1966	99	99	23	
वर्षों की संख्या	28	28	28	28	83	27	27	29	28	27	30	22	23			

CLAUSE NO.	PROJECT INFORMATION																																																															
	<p style="text-align: right;">Annexure-III</p> <p style="text-align: center;"><u>RAW WATER ANALYSIS</u></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Sl. No.</th> <th style="text-align: left;">Constituent</th> <th style="text-align: left;">as</th> <th style="text-align: left;">mg per litre</th> </tr> </thead> <tbody> <tr> <td>1.</td> <td>Calcium</td> <td>CaCO₃</td> <td>65</td> </tr> <tr> <td>2.</td> <td>Magnesium</td> <td>CaCO₃</td> <td>41</td> </tr> <tr> <td>3.</td> <td>Sodium</td> <td>CaCO₃</td> <td>98</td> </tr> <tr> <td>4.</td> <td>Potassium</td> <td>CaCO₃</td> <td>5</td> </tr> <tr> <td>5.</td> <td>Total Cations</td> <td>CaCO₃</td> <td>209</td> </tr> <tr> <td>6.</td> <td>Total Alkalinity</td> <td>CaCO₃</td> <td>150</td> </tr> <tr> <td>7.</td> <td>Chloride</td> <td>CaCO₃</td> <td>25</td> </tr> <tr> <td>8.</td> <td>Sulphate</td> <td>CaCO₃</td> <td>34</td> </tr> <tr> <td>9.</td> <td>Total Anions</td> <td>CaCO₃</td> <td>209</td> </tr> <tr> <td>9.</td> <td>Silica (Reactive)</td> <td>SiO₂</td> <td>9</td> </tr> <tr> <td>11.</td> <td>Iron</td> <td>Fe</td> <td>1.2</td> </tr> <tr> <td>12.</td> <td>pH Value</td> <td>-</td> <td>7.6-8.2</td> </tr> <tr> <td>13.</td> <td>Turbidity</td> <td>NTU</td> <td>200</td> </tr> <tr> <td>14.</td> <td>Organics(As per KMnO₄ method)</td> <td>Number</td> <td>2</td> </tr> </tbody> </table>			Sl. No.	Constituent	as	mg per litre	1.	Calcium	CaCO ₃	65	2.	Magnesium	CaCO ₃	41	3.	Sodium	CaCO ₃	98	4.	Potassium	CaCO ₃	5	5.	Total Cations	CaCO ₃	209	6.	Total Alkalinity	CaCO ₃	150	7.	Chloride	CaCO ₃	25	8.	Sulphate	CaCO ₃	34	9.	Total Anions	CaCO ₃	209	9.	Silica (Reactive)	SiO ₂	9	11.	Iron	Fe	1.2	12.	pH Value	-	7.6-8.2	13.	Turbidity	NTU	200	14.	Organics(As per KMnO ₄ method)	Number	2	
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NORTH KARANPURA STPP (3 X 660 MW) EPC PACKAGE	TECHNICAL SPECIFICATION SECTION – VI, PART-A BID DOC. NO.:CS-4410-001-2	SUB-SECTION-IB PROJECT INFORMATION	PAGE 6 OF 10																																																													

CLARIFIED WATER ANALYSIS

Sl. No.	Constituent	as	mg per litre
1.	Calcium	CaCO ₃	65
2.	Magnesium	CaCO ₃	41
3.	Sodium	CaCO ₃	98
4.	Potassium	CaCO ₃	5
5.	Total Cations	CaCO ₃	209
6.	Total Alkalinity	CaCO ₃	150
7.	Chloride	CaCO ₃	25
8.	Sulphate	CaCO ₃	34
9.	Total Anions	CaCO ₃	209
9.	Silica (Reactive)	SiO ₂	9
11.	Iron	Fe	.03
12.	pH Value	-	7.6-8.2
13.	Turbidity	NTU	10
14.	Organics(As per KMnO ₄ method)	Number	.05

COC-5

TABLE-1
LIGHT DIESEL OIL CHARACTERISTICS
(AS PER IS 15770-2008)

Characteristics	LDO
1. Pour Point (max)	21 °C & 12°C for Summer and Winter respectively
2. Kinematic viscosity in centistokes at 40 deg.C	2.5 to 15.0
3. Sediment percent by mass (max)	0.10
4. Total sulphur percent by mass (max)	1.5
5. Ash percentage by mass (max)	0.02
6. Carbon residue (Rams bottom) percent by pass (max.)	1.50
7. Acidity inorganic	Nil
8. Flash point (Min.) - Pensky Martens	66 deg.C
9. Copper strip corrosion for 3 hours at 100°C	Not worse than No. 2
10. Water content, % by volume (max)	0.25
11. GCV(kcal/kg)	10,000

TABLE-2

ANNEXURE-IV-2

HIGH SPEED DIESEL OIL CHARACTERISTICS

[AS PER IS 1460-2005 (BS-II)]

S. No.	Particulars	Unit	Value
1.	PHYSICAL PROPERTIES		
	a. Distillation volume recovery @ 350 ⁰ C	% vol. (min)	85
	b. Distillation volume recovery @ 370 ⁰ C	% vol. (min)	95
	c. Kinematic Viscosity @ 40 Degree C	cSt	2.0 – 5.0
	d. Density @ 15 Degree C	kg/m ³	820 – 860
	e. Pour Point		
	- Summer	Degree C (max)	15
	- Winter	Degree C (max)	03
	f. Cold Filter Plugging Point		
	- Summer	Degree C (max)	18
	- Winter	Degree C (max)	06
	g. Flash Point (Abal)	Degree C (max)	35
	h. Lubricity WSD 1.4 @ 60 Degree C	Microns (max)	460
2.	HEATING VALUE		
	a. Higher Heating Value (HHV)	Kcal/Kg	11,000
	b. Lower Heating Value (LHV)	Kcal/Kg	10,300
3.	ACIDITY		
	a. Inorganic	mg KOH/g	Nil
	b. Total	mg KOH/g	0.2 (max.)
4.	Copper Strip Corrosion 3 hours @100 ⁰ C	No.	1 (max)
5.	RCR on 10% residue	% wt.	0.3 (max)
6.	CONTAMINANTS		
	a. Ash	ppm (wt.)	100 (max)
	b. Sediments	% wt	0.05 (max)
	c. Total Sulphur	% wt	0.05 (max)
	d. Water Content	% volume	0.05 (max)
	e. Trace Metals		
	- Na + K	ppm (wt)	0.30 (max)
	- Vanadium	ppm (wt)	0.50 (max)
	- Lead	ppm (wt)	0.50 (max)
	- Calcium	ppm (wt)	2.0
	- Ni + Zn	ppm (wt)	Nil
7.	Nitrogen content (FBN)	% wt.	0.015

TABLE-3

ANNEXURE-IV-3

**PROPOSED COAL CHARACTERISTICS FOR NORTH KARANPURA
STPP (3 x 660 MW)**

S.No.	Characteristics (as received basis)	Range of 95 % coal supplies			Range of 5 % coal supplies
		Column - 1	Column - 2	Column - 3	
1.0	PROXIMATE ANALYSIS	Design	Worst	Best	
1.1	Total Moisture (%)	15	18	12	12-18
1.2	Ash (%)	40	46	36	33-46
1.3	Volatile Matter (%)	19	18	22	23-18
1.4	Fixed Carbon (%)	26	18	30	31-18
1.5	Total (%)	100	100	100	
2.0	ULTIMATE ANALYSIS				
2.1	Carbon (%)	29.73	23.08	37.32	40.62-23.08
2.2	Hydrogen (%)	3.7	3.54	3.92	4.02-3.54
2.3	Sulphur (%)	0.5	0.6	0.4	0.4-0.6
2.4	Nitrogen(%)	1.8	1.45	1.6	1.4-1.45
2.5	Oxygen(%) (By difference)	8.66	6.7	8.32	8.12-6.7
2.6	Carbonates (%)	0.58	0.6	0.4	0.4-0.6
2.7	Phosphorous(%)	0.03	0.03	0.04	0.04-0.03
2.8	Total Moisture (%)	15	18	12	12-18
2.9	Ash (%)	40	46	36	33-46
	Total	100	100	100	
2.10	GCV (Kcal/Kg)	3300	2800	4000	4300-2800
2.11	Hard Grove Index	55	50	60	50-65
3.0	ASH ANALYSIS				
3.1	Silica (%)	59.79	61.3	56.7	62-56
3.2	Alumina(%)	25.36	28	23.5	28-23
3.3	Iron Oxide (%)	7.2	6	10	6-10
3.4	Titania	1.2	1	1.5	1-1.7
3.5	Phosphoric Anhydride (%)	2.6	1.5	3	1-3
3.6	Lime (%)	0.88	0.5	1.5	0.5-1.7
3.7	Magnesia (%)	0.55	0.4	1	0.4-1.1
3.8	Sulphuric Anhydride (%)	1.2	0.5	1.4	0.5-1.7
3.9	Alkalies (by difference)	1.22	0.8	1.4	0.6-1.8
	Total	100	100	100	
4.0	ASH FUSION RANGE				
	REDUCING ATMOSPHERE				
4.1	Initial Deformation Temp.(oC)	1100	1100	1100	1100-1150
4.2	Hemispherical Temp. (oC)	1300	1250	1350	1250-1400
4.3	Fusion Temperature (oC)	1400	1400	1400	1400-1450

TABLE – 4

TYPICAL IMPORTED COAL AND ASH CHARACTERISTICS

Sl.No.	Characteristics (as received basis)	Imported Coal	
		Worst	Best
1.0	Proximate Analysis		
1.1	Total Moisture (%)	20	16
1.2	Ash (%)	10	10
1.3	Volatile Matter (%)	30	45
1.4	Fixed Carbon (%)	40	29
1.5	Total (%)	100	100
2.0	Ultimate Analysis		
2.1	Carbon (%)	56.4	62.4
2.2	Hydrogen (%)	4.5	4.9
2.3	Sulphur (%)	0.9	0.8
2.4	Nitrogen (%)	0.9	0.5
2.5	Oxygen (%) (By difference)	7.3	5.4
2.6	Carbonates (%)	0	0
2.7	Phosphorous (%)	0	0
2.8	Total Moisture (%)	20	16
2.9	Ash (%)	10	10
	Total	100	100
2.10	GCV (Kcal/Kg)	5800	6500
2.11	Hard Grove Index	45	60
2.12	YGP (mg/kg)	100	70
3.0	Ash Analysis		
3.1	Silica (SiO ₂) (%)	32.74	34.94
3.2	Alumina(Al ₂ O ₃) (%)	30.5	28.43
3.3	Iron Oxides(Fe ₂ O ₃) (%)	18.2	15.2
3.4	Titania (TiO ₂)	1.56	1.76
3.5	Phosphoric Anhydride(P ₂ O ₅) (%)	0.44	0.54
3.6	Lime (CaO) (%)	6.12	7.62
3.7	Magnesia (MgO) (%)	1.83	1.93
3.8	Sulphuric Anhydride (%)	6.95	7.65
3.9	Sodium Oxide (Na ₂ O) (%)	0.3	0.4
3.10	Balance alkalies (by difference)	1.36	1.56
	Total	100	100
4.0	Ash Fusion Temperature reducing temperature		
4.1	Initial deformation Temp (°C)	1100	1250
4.2	Hemispherical Temp. (°C)	1300	1350
4.3	Flow Temp. (°C)	1400	1400



**TITLE : TECHNICAL SPECIFICATION
FOR
SELF CLEANING STRAINERS (SCS)**

SPEC. NO. PE-TS-405-165-N003

VOLUME : II B

SECTION : C

REV. NO. 0

DATE :15.07.2014

SHEET

1

of

1

SECTION – C

SPECIFIC REQUIREMENTS

SECTION C1 : SELF CLEANING STRAINERS

SECTION C2 : ELECTRICAL SYSTEMS

SECTION C3 : C&I SYSTEMS



**TITLE : TECHNICAL SPECIFICATION
FOR
SELF CLEANING STRAINERS (SCS)**

SPEC. NO. PE-TS-405-165-N003

VOLUME : IIB

SECTION : D

REV. NO. 0

DATE :15.07.2014

SHEET 1of 1

**SECTION C1
SELF CLEANING STRAINERS
(MECHANICAL DETAILS)**



TITLE : TECHNICAL SPECIFICATION
FOR

SELF CLEANING STRAINERS (SCS).

SPEC. NO: PE-TS-405-165-N003

VOLUME : II B

SECTION:C1

REV. NO. 0

DATE :15.07.2014

SHEET 1 OF 8

1.0 GENERAL

The Self Cleaning Strainers (SCS) complete with all accessories shall conform to the standard technical specifications (Section-D) and Data Sheet-A enclosed herewith. In addition the requirements of this section C shall also be complied with. However, wherever the details given in Section-D and Data Sheet-A are different, the requirements of Data Sheet-A shall prevail. Similarly in the event of contradictions between Section-C & Section-D/ Data Sheet-A, Section-C shall prevail.

Section C consists of 3 parts viz. Sec. C1, C2 and C3 for Mechanical, Electrical and C&I respectively, the requirements of all 3 sections shall be complied with.

2.0 DESCRIPTION OF EQUIPMENTS :

2.1 Self Cleaning Strainers (SCS) :

Self Cleaning Strainers per unit where specified shall be installed on the discharge side of ACW pumps. The water through the self cleaning strainers outlet shall be supplied to the Secondary side of Plate Heat Exchangers. The water analysis is indicated in project information in section B.

3.0 SCOPE OF SUPPLY UNDER THE SPECIFICATION IN THE BIDDER'S SCOPE FOR SELF CLEANING STRAINERS.

3.1 The scope of supply for Self Cleaning Strainers covered under this specification is as under.

The size, MOC's and other particulars of the equipments are detailed in Data Sheet A annexed with Section – D of the specification.

SL.NO.	PROJECT	SELF CLEANING STRAINERS	
1.	3X660 MW NTPC North Karanpura	- 2 SETS PER UNIT VIZ. TOTAL 6 SETS FOR 3 UNIT	- 2 SETS COMMON FOR STATION- AHS COMPRESSORS COOLING SYSTEM viz 2 nos.



TITLE : TECHNICAL SPECIFICATION
FOR

SELF CLEANING STRAINERS (SCS).

SPEC. NO: PE-TS-405-165-N003

VOLUME : II B

SECTION:C1

REV. NO. 0

DATE :15.07.2014

SHEET 2 OF 8

3.2 SCOPE OF SUPPLY OF SCS INCLUDED IN THE BIDDER'S SCOPE :

The Qty of SCS covered under the specification shall be as per Data Sheet A of respective projects.

Each self cleaning strainer shall be complete with following accessories and auxiliaries.

- a) All equipment's for this package viz. Strainers, actuators, instruments etc. shall be suitable for outdoor operation.
- b) Flushing pump with drive Motor (as per manufacturer's design) - 1 No.
- c) Supply of complete debris disposal pipe work shall be in scope of Bidder. However bidder is to consider minimum 40 mtr. of debris disposal pipework and 5 numbers bends for each SCS in their scope of supply. In case actual piping comes out to be less than 40 mtrs. and number of bends less than 5 nos. still bidder has to supply 40 mtrs pipework and 5 nos. bends as minimum requirement. Bidder shall finalize the pipework to suit the layout at contract stage in such a way that no site welding is required for his pipework otherwise the same shall be carried out by bidder at site.
- d) Filter body/ housing Vent and Drain connections along with their isolating valves.
- e) SCS shall be supplied along with flanges as well as the Counter flanges, complete with bolts, nuts and gaskets.
- f) Differential pressure measuring system for SCS. DP measuring system shall comprise of 2 Nos. DPT + 1 No. DPG for SCS and shall be with *Remote seal* arrangement. Stubs for DPT and DPG shall be independent.
- g) Supporting arrangement complete with foundation plates, anchor bolts, nuts, sleeves, inserts, all installation materials, fixing bolts, clamps, saddle supports (if applicable) and other accessories etc for complete equipment supplied under this package.
- h) Set of commissioning spares, on "As required basis".
- i) The Electrical & C&I items/ accessories as specified in succeeding clause / respective sections herein.
- j) Scope of Starter Panel (Switch Gear Panel) shall be as follows:

2 Sets of SCS shall have one Common Starter Panel (Switch Gear Panel) for



TITLE : TECHNICAL SPECIFICATION
FOR

SELF CLEANING STRAINERS (SCS).

SPEC. NO: PE-TS-405-165-N003

VOLUME : II B

SECTION:C1

REV. NO. 0

DATE :15.07.2014

SHEET 3 OF 8

DCS based control system in line with C&I requirement (refer section C-3).

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

- k) Power and Control cables between Starter Panel (Switch Gear Panel) and various drives in bidder's scope of supply.
- l) Control cables between field instruments and junction box / Starter Panel (Switch Gear Panel).
- m) Set of mandatory spares as indicated in Data Sheet A.
- n) All the field instruments stipulated in this specification shall be in Bidder's scope.
- o) Finish paints for touch up painting of equipment after erection at site, in sealed containers.
- p) Set of special tools and tackles if required for maintenance and erection of the equipment supplied.
- q) Various drawings, data test reports/ certificates instruction manuals for erection operation and maintenance etc. as specified in Data Sheet-C. and cables schedule indicating BOQ for power & control cables.
- r) Local Control Panels & Instruments: Scope and Type as specified in C&I section wherever required.

Any item not specified but required to make SCS a complete package shall also be in bidders scope.

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

The bidder's scope also includes following services at site, for scope under this specification for SCS for respective projects

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

The trial run of equipment shall be generally conducted immediately after commissioning while PG testing shall be conducted at a later date. These activities for different units shall be timed separately.



TITLE : TECHNICAL SPECIFICATION
FOR

SELF CLEANING STRAINERS (SCS).

SPEC. NO: PE-TS-405-165-N003

VOLUME : II B

SECTION:C1

REV. NO. 0

DATE :15.07.2014

SHEET 4 OF 8

The no. of visits may be suitably assessed by bidders as per their experience with site stay periods on as required basis.

In the event of order no. of visits as follows shall be made as a minimum with charges included in the bidder's base price itself.

- **For drawings/documents approval**

In the event of order all drawings / documents in soft as well as hard copy shall be submitted as per NIT.

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

- **Site Visits :**

- i. No. of site visits for combined activities of erection checks and commissioning for SCS as applicable shall be one per unit - for both sets of equipments of one unit. Time duration for erection and commissioning shall be "on as required basis" with equipments run for trial operation thereafter for requisite period to demonstrate satisfactory operation.

However the no. of visits may be suitably assessed by bidders as per their experience with site stay periods on as required basis.

- ii. Bidder shall demonstrate guarantees including pressure drops at site during subsequent visit for SCS of each unit.
- iii. For trouble shooting on "as required basis".

5.0 EXCLUSIONS :

The following are excluded from the bidder's scope .

- 5.1 Civil foundation works required for installation
- 5.2 Erection of Equipment at site.

6.0 DESIGN CONSTRUCTION :

In addition to the requirements of Section-D the following shall also be complied with for packages/ projects under scope of this specification:



TITLE : TECHNICAL SPECIFICATION
FOR

SELF CLEANING STRAINERS (SCS).

SPEC. NO: PE-TS-405-165-N003

VOLUME : II B

SECTION:C1

REV. NO. 0

DATE :15.07.2014

SHEET 5 OF 8

- 6.1 The materials of construction specified in Data Sheet-A are minimum requirements and materials of construction for other components not specified shall be similarly selected by the bidder for the intended duty which shall be subject to purchaser's approval during detailed engineering in the event of order.
- 6.2 Housing/ body of SCS Filter shall be designed and manufactured as per the applicable codes for pressure vessels and to take care of force and moments as enclosed in the specification. However in no case thickness of housing/ body shall be less than the thickness as specified in "Pipe size Table" enclosed in Data Sheet-A of SCS.
- 6.3 Adequate provision for future installation of Cathodic Protection for SCS (Sacrificial type shall be in Purchaser Scope) shall be kept by the bidder in the equipment.
- 6.4 Velocity in the pipe work shall be less than 1.5 m/ sec for pump suction and less than 2.2 m/ sec. in other pipe work. All valves upto 150 NB shall be ball valves. For higher sizes, gate/ globe/ B.F. valves shall be provided. All instrument valves shall be needle valves.

7.0 Self Cleaning Strainers :

7.1.1 Performance Guarantee Parameters shall be as under :

- Pressure drop in Self Cleaning Strainers in clean condition viz. after backwashing.

7.1.2 Bidder to note that bids shall be evaluated on account of pressure drop across Self Cleaning Strainers (in clean condition) & liquidated damages on account of not meeting the same shall be in accordance with following :

A) Bid Evaluation Criteria and Liquidated Damages:

The bids received shall be evaluated for Pressure drop across Self Cleaning strainers :

- The permissible limit of pressure drop across self cleaning strainers in clean condition shall be 0.6 MWC.
- If the pressure drops quoted are higher than above limit, the bids shall be technically loaded @ Rate as mentioned in Data Sheet-A on pro-rata basis per **0.1 MWC** pressure drop (viz. per unit).
- However no advantage shall be given for pressure drops quoted less than above permissible limit.
- The maximum acceptable limit for pressure drop across self cleaning strainer (with technical loadings) shall be 1.0 MWC.
The bids will be technically rejected for pressure drops quoted higher than above maximum limit.



TITLE : TECHNICAL SPECIFICATION
FOR

SELF CLEANING STRAINERS (SCS).

SPEC. NO: PE-TS-405-165-N003

VOLUME : II B

SECTION:C1

REV. NO. 0

DATE :15.07.2014

SHEET 6 OF 8

- The guaranteed pressure drops shall be demonstrated at site by vendors and if found higher shall be subject to LD @ twice the bid evaluation factor as above.

8.0 SPARES :

8.1 Recommended Spares :

The supply of spare parts as necessary recommended by the manufacture for three (3) years of reliable operation and maintenance of SCS of respective projects shall be supplied. List of such spares along with the unit price shall not be included in base price but indicated separately in the schedule of prices for recommended spares enclosed in Vol. -III.

8.2 Mandatory Spares

Mandatory Spares shall be as per Data Sheet-A, prices for same shall be included by bidder in the equipment base price itself.

9.0 Quality Plan

Bidder shall submit QP in the event of order based on the guidelines given in the specification & QP enclosed therein. QP will be subject to BHEL/ Customer approval and customer hold points for inspection/ testing shall be marked in the QP at the contract stage. Inspection/ testing shall be witnessed as per same apart from review of various test certificates/ Inspection records etc. Charges for 3rd party inspection (TUV/ equivalent) for imported components wherever required shall be included by bidder in the base price itself. Witness for all the test identified under agency "C" & "N" in Quality plan shall be by third party.

If BHEL or BHEL customer decides to witness the tests along with third party, the cost of travel of BHEL or BHEL customer shall be borne by BHEL or BHEL customer themselves.

10.0 DELIVERY & DRAWINGS/ DOCUMENTS DISTRIBUTION SCHEDULE :

- Delivery of Equipment for each project shall be as per NIT.
- The drawings to be submitted by bidder in event of award of contract for SCS for project shall be as follows:
 - Technical Data Sheets, P&ID, Installation Plan , for ,SCS .
 - GA drawings, C & I Document(Part-I & II) of SCS as applicable.
 - Quality Plan.
 - O & M Manual
- Drawings submission schedule shall be as per NIT/as advised by Project Group.



TITLE : TECHNICAL SPECIFICATION
FOR

SELF CLEANING STRAINERS (SCS).

SPEC. NO: PE-TS-405-165-N003

VOLUME : II B

SECTION:C1

REV. NO. 0

DATE :15.07.2014

SHEET 7 OF 8

11.0 The makes of various bought out items shall be subjected to purchaser's approval in the event of order.

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

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

- Compliance certificate duly signed and stamped (Enclosed at Schedules).
- Guarantee schedule duly signed and stamped (Enclosed at Schedules).
- GA drawings of following with empty/ filled-ups.
 - GA of SCS (As applicable).
 - Debris Flushing pumps (if applicable)
 - Other equipments considered necessary for Layout/ Civil.
- Electrical Load Data (Enclosed at Vol. III of Specification)
- Schedule of Deviation (Enclosed at Schedules).

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

14.0 Important Note:-

- i. Bidder to note that C&I, Electrical, Fragile materials shall be sent in separate proper packing (segregating from heavy items).
- ii. Bidder to include handling instructions in engineering drg/doc and packing to be done in such a way to avoid damage of items mention above in transit and long storage at site and same shall be approved in contract stage by BHEL/ Customer.

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



TITLE : TECHNICAL SPECIFICATION
FOR

SELF CLEANING STRAINERS (SCS).

SPEC. NO: PE-TS-405-165-N003

VOLUME : II B

SECTION:C1

REV. NO. 0

DATE :15.07.2014

SHEET 8 OF 8

ANNEXURE-I

SELF CLEANING STRAINERS

SL.NO.	Projects	Size (NB)	Length of SCS (Including Counter Flange)	Scope of Counter Flange	Scope of nuts and bolts.
1.	3X660 MW NTPC North Karanpura	800 NB	2500 mm	In Bidder's Scope	In Bidder's Scope
2.	3X660 MW NTPC North Karanpura	350 NB	2500 mm	In Bidder's Scope	In Bidder's Scope



**TITLE : TECHNICAL SPECIFICATION
FOR
SELF CLEANING STRAINERS (SCS)**

SPEC. NO. PE-TS-405-165-N003

VOLUME : IIB

SECTION : D

REV. NO. 0

DATE :15.07.2014

SHEET 1of 1

**SECTION C2
SELF CLEANING STRAINERS
ELECTRICAL DETAILS**

ELECTRICAL EQUIPMENT SPECIFICATION FOR SCS 3X660MW NORTH KATANPURA STPP	SPECIFICATION NO.
	VOLUME NO. : II-B
	SECTION : C
	REV NO. : 00 DATE : 17.07.14
	SHEET : 1 OF 2

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) Erection and Commissioning spares.
- e) Erection & Maintenance tools & tackles.
- f) Electrical load requirement for SCS system.
- g) All equipment shall be suitable for the power supply fault levels and other climatic conditions mentioned in the enclosed project information.
- h) 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
- i) 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.
- j) Motor shall meet minimum requirement of motor specification.
- k) LT power & control cables shall meet minimum requirement of LT power & control cables specification.
- l) Cabling, earthing & lightning protection shall meet minimum requirement of cabling, earthing & lightning protection specification.

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 Bidder shall confirm total compliance to the electrical specification without any deviation from the technical/quality assurance requirements stipulated. In line with this two signed and stamped copies of the following shall be furnished by the bidder as technical offer:
 - a) A copy of this sheet ”Electrical equipment Specification for SCS and sheet “Electrical Scope between BHEL and Vendor” with bidder’s signature and company stamp.
 - b) List of Erection and Commissioning spares.
 - c) List of Erection & Maintenance tools & tackles.
 - d) Electrical load requirement
- 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.

**ELECTRICAL EQUIPMENT SPECIFICATION
FOR
SCS
3X660MW NORTH KATANPURA STPP**

SPECIFICATION NO.

VOLUME NO. : **II-B**

SECTION : **C**

REV NO. : **00** DATE : 17.07.14

SHEET : 2 OF 2

4.0 List of enclosures :

- a) Electrical scope between BHEL & vendor.
- b) Technical specification, datasheets & quality plans for 415V Electric motors.
- c) Technical Specification, datasheets & quality plans for LT power & control cables.
- d) Technical Specification, datasheets & quality plans for cabling, earthing & lightning protection.
- e) Electrical Load data format.

ELECTRICAL SCOPE BETWEEN BHEL AND VENDOR

PACKAGES : SCS

SCOPE OF CIVIL WORKS: BHEL

S.NO	DETAILS	SCOPE SUPPLY	SCOPE E&C	REMARKS
1	a) 415V MCC b) Starter panel	BHEL Vendor	BHEL BHEL	<i>a1. 415 V AC/240 V AC supply shall be provided by BHEL based on load data provided by vendor at contract stage for all equipment supplied by vendor as part of contract including power supply equipment (battery charger etc) required for the PLC/control panel (as applicable) for the system supplied by vendor.</i> a2. Interposing relays (RE 302 of Jyoti make or equivalent), if required for PLC and microprocessor based systems, shall be provided by BHEL in MCCs. Requirement of these relays shall be furnished by vendor during detailed engineering stage.
2	Local Push Button Station (for motors)	BHEL	BHEL	Located near the motor.
3	Power cables, control cables and screened control cables for a) both end equipment in BHEL's scope b) both end equipment in vendor's scope c) one end equipment in vendor's scope	BHEL Vendor BHEL	BHEL BHEL BHEL	1. Sizes and quantity of cables required shall be informed by vendor at contract stage (based on inputs provided by BHEL). Finalisation of cable sizes shall be done by BHEL. Vendor shall provide lugs & glands accordingly.
4	Any special type of cable like compensating, co-axial, prefab, MICC, fibre optical etc.	Vendor	BHEL	
5	Cable trays, accessories & cable trays supporting system	BHEL	BHEL	Local cabling from nearby tray to equipment terminal shall be through conduits.
6	Cable glands and lugs for equipment supplied by Vendor	Vendor	BHEL	1. Double compression Ni-Cr plated brass cable glands 2. Solder less crimping type tinned copper heavy duty lugs for power cables suitable for aluminium compacted conductor cables 3. Solder less crimping type heavy duty copper lugs for control cables.
7	Conduit and conduit accessories for cabling between equipment supplied by vendor	Vendor	BHEL	Conduits shall be medium duty, hot dip galvanised cold rolled mild steel rigid conduit as per IS: 9537. Makes of conduits shall be subject to customer/ BHEL approval at contract stage.

ELECTRICAL SCOPE BETWEEN BHEL AND VENDOR

PACKAGES : SCS

SCOPE OF CIVIL WORKS: BHEL

S.NO	DETAILS	SCOPE SUPPLY	SCOPE E&C	REMARKS
8	Lighting	BHEL	BHEL	
9	Equipment grounding & lightning protection	BHEL	BHEL	
10	Below grade grounding	BHEL	BHEL	
11	LT Motors with base plate and foundation hardware	Vendor	BHEL	Makes shall be subject to customer/ BHEL approval at contract stage.
12	Mandatory spares	Vendor	-	Vendor to quote as per specification.
13	Recommended O & M spares, E & C spares, erection & maintenance tools & tackle.	Vendor	-	As per specification
14	Any other equipment/ material/ service required for completeness of system based on system offered by the vendor (to ensure trouble free and efficient operation of the system).	Vendor	BHEL	
15	a) Input cable schedules (C & I) b) Cable interconnection details for above c) Cable block diagram	Vendor Vendor Vendor	- - -	Cable listing (including soft copy)/ BHEL Cable Schedule in excel format (excel format shall be provided to vendor during contract stage) for C & I system for the package shall be submitted by vendor during detailed engineering stage.
16	Equipment layout drawings	Vendor	-	<ol style="list-style-type: none"> For ensuring cabling requirements are met, vendor shall furnish layout drawings (both in print form as well as in AUTOCAD) of the complete plant (including electrical area) indicating location and identification of all equipment requiring cabling, and shall incorporate cable trays routing details marked on the drawing as per PEM interface comments. Electrical equipment layout drawing shall be subjected to BHEL/ customer approval. Layout drawing preparation wherever in vendor's scope: the cabling arrangement of the same (wherever overhead cable trays, trenches, cable ducts etc) shall be decided during contract stage, and the arrangement philosophy/ approval of the same shall be subject to BHEL/Customer approval without any commercial implications to BHEL.
17	Electrical Equipment GA drawing	Vendor	-	For necessary interface review.

ELECTRICAL SCOPE BETWEEN BHEL AND VENDOR**PACKAGES : SCS****SCOPE OF CIVIL WORKS: BHEL****NOTES:**


1. Make of all electrical equipments/items supplied shall be reputed make & shall be subject to approval of BHEL/customer after award of contract.
2. All QPs shall be subject to approval of BHEL/customer after award of contract without any commercial implication.
3. For skid mounted system, 2 nos. (1W+1S) supply feeders of 415 V, 3 phase AC shall be provided by BHEL. Complete skid including changeover between feeders/starters/LCP/ inter-locks/protection devices /any other supply etc. shall be in bidder's scope only. Bidder to also provide 24 V AC supply and suitable arrangement for switching it on automatically for heating of motor stator winding during motor's idle time


	TITLE LV MOTORS <u>DATA SHEET-A</u>	SPECIFICATION NO.	
		VOLUME	II B
		SECTION	D
		REV NO. 00	DATE 01/10/2012
		SHEET	1 OF 1


- 1.0 Design ambient temperature : 50 °C
- 2.0 Maximum acceptable kW rating of LV motor : ≤200KW
- 3.0 Installation (Indoors/ Outdoors) : As required
- 4.0 Degree Of Protection (Indoor/Outdoor) : IP54/IP55
- 5.0 Type of Cooling : TEFC/CACA/TETV
- 6.0 Details of supply system
- a) Rated voltage (with variation) : 415V ± 10%
- b) Rated frequency (with variation) : 50 Hz (Variation: +3% TO -5%)
- c) Combined voltage & freq. variation : 10%
- d) System fault level at rated voltage : 45 kA for 1 sec
- e) Short time rating for terminal boxes
- o 110kW & Above : 45 kA for 1 sec
(Breaker controlled)
- o Below 110kW (SFU+ : 45 KA for 0.20 sec.
Contactor controlled)
- f) LV System grounding : Solidly
- 7.0 Class of insulation : Class 'F', with temp rise limited to class B.
(Refer clause 5.00.00 of Motors)
- 8.0 Minimum voltage for starting : 85% of rated voltage
(As percentage of rated voltage)
- 9.0 Power cables data : Shall be given during Detailed engg.
- 10.0 Earth Conductor Size & Material : Shall be given during Detailed engg.
- 11.0 Space heater supply : 240 V, 1Φ , 50 Hz
- 12.0 Rating up to which Single phase motor : Acceptable below 0.20 kW
- 13.0 Tests : As per Customer motor spec. (enclosed)
- 14.0 Energy efficient/ Flame proof motor : As per Customer spec. requirement


- Also detail Customer spec. for Motors to be referred as enclosed with spec.


SUB-SECTION – B-07
MOTORS


CLAUSE NO.	TECHNICAL REQUIREMENTS															
MOTORS																
1.00.00	GENERAL REQUIREMENTS															
1.01.00	For the purpose of design of equipment/systems, an ambient temperature of 50 deg. Centigrade and relative humidity of 95% (at 40 deg C) shall be considered. The equipment shall operate in a highly polluted environment.															
1.02.00	All equipments shall be suitable for rated frequency of 50 Hz with a variation of +3% & - 5%, and 10% combined variation of voltage and frequency unless specifically brought out in the specification.															
1.03.00	Contractor shall provide fully compatible electrical system, equipments, accessories and services.															
1.04.00	All the equipment, material and systems shall, in general, conform to the latest edition of relevant National and international Codes & Standards, especially the Indian Statutory Regulations.															
1.05.00	Paint shade shall be as per RAL 5012 (Blue) for indoor and outdoor equipment.															
1.06.00	The responsibility of coordination with electrical agencies and obtaining all necessary clearances for contractors equipment and systems shall be under the contractor scope.															
1.07.00	<p>Degree of Protection</p> <p>Degree of protection for various enclosures as per IS:4691, IEC60034-05 shall be as follows :-</p> <table border="0" data-bbox="363 1317 1010 1529"> <tr> <td>i) Indoor motors</td> <td>-</td> <td>IP 54</td> </tr> <tr> <td>ii) Outdoor motors</td> <td>-</td> <td>IP 55</td> </tr> <tr> <td>iii) Cable box-indoor area</td> <td>-</td> <td>IP 54</td> </tr> <tr> <td>iv) Cable box-Outdoor area</td> <td>-</td> <td>IP 55</td> </tr> </table>				i) Indoor motors	-	IP 54	ii) Outdoor motors	-	IP 55	iii) Cable box-indoor area	-	IP 54	iv) Cable box-Outdoor area	-	IP 55
i) Indoor motors	-	IP 54														
ii) Outdoor motors	-	IP 55														
iii) Cable box-indoor area	-	IP 54														
iv) Cable box-Outdoor area	-	IP 55														
2.00.00	CODES AND STANDARDS															
1)		Three phase induction motors	:	IS:325, IEC:60034												
2)		Single phase AC motors	:	IS:996, IEC:60034												
3)		Crane duty motors	:	IS:3177, IEC:60034												
4)		DC motors/generators	:	IS:4722												
5)		Energy Efficient motors	:	IS 12615, IEC:60034-30												
NORTH KARANPURA STPP (3 X 660 MW) EPC PACKAGE	TECHNICAL SPECIFICATIONS SECTION VI, PART-B BID DOC. NO.:CS-4410-001-2	SUB SECTION B-07 MOTORS	Page 1 of 9													


CLAUSE NO.	TECHNICAL REQUIREMENTS			
3.00.00	TYPE			
3.01.00	AC Motors: <ol style="list-style-type: none"> a) Squirrel cage induction motor suitable for direct-on-line starting. b) Continuous duty LT motors upto 160 KW Output rating (at 50 deg.C ambient temperature), shall be Premium Efficiency class-IE3, conforming to IS 12615, or IEC:60034-30. c) Crane duty motors shall be slip ring/ squirrel cage Induction motor as per the requirement. 			
3.02.00	DC Motors	Shunt wound.		
4.00.00	RATING			
5.00.00	TEMPERATURE RISE Air cooled motors 70 deg. C by resistance method for both thermal class 130(B) & 155(F) insulation. Water cooled 80 deg. C over inlet cooling water temperature mentioned elsewhere, by resistance method for both thermal class 130(B) & 155(F) insulation.			
6.00.00	OPERATIONAL REQUIREMENTS			
6.01.00	Starting Time			
6.01.01	For motors with starting time upto 20 secs. at minimum permissible voltage during starting, the locked rotor withstand time under hot condition at highest voltage limit shall be at least 2.5 secs. more than starting time.			
NORTH KARANPURA STPP (3 X 660 MW) EPC PACKAGE	TECHNICAL SPECIFICATIONS SECTION VI, PART-B BID DOC. NO.:CS-4410-001-2	SUB SECTION B-07 MOTORS	Page 2 of 9	

CLAUSE NO.	TECHNICAL REQUIREMENTS			
6.01.02	For motors with starting time more than 20 secs. and upto 45 secs. at minimum permissible voltage during starting, the locked rotor withstand time under hot condition at highest voltage limit shall be at least 5 secs. more than starting time.			
6.01.03	For motors with starting time more than 45 secs. at minimum permissible voltage during starting, the locked rotor withstand time under hot condition at highest voltage limit shall be more than starting time by at least 10% of the starting time.			
6.01.04	Speed switches mounted on the motor shaft shall be provided in cases where above requirements are not met.			
6.02.00	Torque Requirements			
6.02.01	Accelerating torque at any speed with the lowest permissible starting voltage shall be at least 10% motor full load torque.			
6.02.02	Pull out torque at rated voltage shall not be less than 205% of full load torque. It shall be 275% for crane duty motors.			
6.03.00	Starting voltage requirement (a) 85% below 110 KW (b) 80% from 110 KW to 200 KW (c) 85% above 200 KW to 1000 KW (d) 80% from 1001 KW to 4000 KW (e) 75% above 4000KW Except AOP & JOP motors running on D.G emergency supply, starting voltage shall be 80%.			
7.00.00	DESIGN AND CONSTRUCTIONAL FEATURES			
7.01.00	Suitable single phase space heaters shall be provided on motors rated 30KW and above to maintain windings in dry condition when motor is standstill. Separate terminal box for space heaters & RTDs shall be provided. However for flame proof motors , space heater terminals inside the main terminal box may be acceptable.			
7.02.00	All motors shall be either Totally enclosed fan cooled (TEFC) or totally enclosed tube ventilated (TETV) or Closed air circuit air cooled (CACA) type. However, motors rated 3000KW or above can be Closed air circuit water cooled (CACW). Motors and EPB located in hazardous areas shall have flame proof enclosures conforming to IS:2148 as detailed below (a) Fuel oil area : Group – IIB			
NORTH KARANPURA STPP (3 X 660 MW) EPC PACKAGE	TECHNICAL SPECIFICATIONS SECTION VI, PART-B BID DOC. NO.:CS-4410-001-2	SUB SECTION B-07 MOTORS	Page 3 of 9	


CLAUSE NO.	TECHNICAL REQUIREMENTS		
7.03.00	(b) Hydrogen generation Winding and Insulation (a) Type (b) Starting duty (c) 11kV & 3.3 kV AC motors (d) 240VAC, 415V AC & 220V DC motors	:Group - IIC or (Group-I, Div-II as per plant area NEC) or (Class-1, Group-B, Div-II as per NEMA /IEC60034) : Non-hygrosopic, oil resistant, flame resistant : Two hot starts in succession, with motor initially at normal running temperature. : Thermal class 155 (F) insulation. The winding insulation process shall be total Vacuum Pressure Impregnated i.e resin poor method. The lightning Impulse & interturn insulation surge withstand level shall be as per IEC-60034 part-15 : Thermal Class(B) or better Motors rated above 1000KW shall have insulated bearings to prevent flow of shaft currents. Motors with heat exchangers shall have dial type thermometer with adjustable alarm contacts to indicate inlet and outlet primary air temperature. Noise level for all the motors shall be limited to 85dB(A) except for BFP motor for which the maximum limit shall be 90dB(A). Vibration shall be limited within the limits prescribed in IS:12075 / IEC 60034-14 . Motors shall withstand vibrations produced by driven equipment. HT motor bearing housings shall have flat surfaces, in both X and Y directions, suitable for mounting 80mmX80mm vibration pads. In HT motors, at least four numbers simplex / two numbers duplex platinum resistance type temperature detectors shall be provided in each phase stator winding. Each bearing of HT motor shall be provided with dial type thermometer with adjustable alarm contact and preferably 2 numbers duplex platinum resistance type temperature detectors. Motor body shall have two earthing points on opposite sides. 11 KV motors shall be offered with Separate Insulated Connector (Elastimould or Equivalent make) as per IEEE 386. The offered Elastimould terminations shall be provided with protective cover and trifurcating sleeves. Elastimould termination kit shall be suitable for fault level of 25 KA for 0.17 seconds. 3.3 KV motors shall be offered with dust tight phase separated double walled (metallic as well as insulated barrier) Terminal box. Suitable termination kit shall be provided for the offered Terminal box. The offered Terminal Box shall be suitable for fault level of 250	
NORTH KARANPURA STPP (3 X 660 MW) EPC PACKAGE	TECHNICAL SPECIFICATIONS SECTION VI, PART-B BID DOC. NO.:CS-4410-001-2	SUB SECTION B-07 MOTORS	Page 4 of 9

CLAUSE NO.	TECHNICAL REQUIREMENTS		
	<p>MVA for 0.12 sec. Removable gland plates of thickness 3 mm (hot/cold rolled sheet steel) or 4 mm (non magnetic material for single core cables) shall be provided.</p>		
7.11.00	<p>The spacing between gland plate & centre of terminal stud shall be as per Table-I.</p>		
7.12.00	<p>All motors shall be so designed that maximum inrush currents and locked rotor and pullout torque developed by them at extreme voltage and frequency variations do not endanger the motor and driven equipment.</p>		
7.13.00	<p>The motors shall be suitable for bus transfer schemes provided on the 11kV, 3.3 kV /415V systems without any injurious effect on its life.</p>		
7.14.00	<p>For motors rated 2000 KW & above, neutral current transformers of PS class shall be provided on each phase in a separate neutral terminal box.</p>		
7.15.00	<p>The size and number of cables (for HT and LT motors) to be intimated to the successful bidder during detailed engineering and the contractor shall provide terminal box suitable for the same.</p>		
8.00.00	<p>The ratio of locked rotor KVA at rated voltage to rated KW shall not exceed the following (without any further tolerance) except for BFP motor.</p> <p>(a) Below 110KW : 10.0</p> <p>(b) From 110 KW & upto 200 KW : 9.0</p> <p>(c) Above 200 KW & upto 1000KW : 10.0</p> <p>(d) From 1001KW & upto 4000KW : 9.0</p> <p>(e) Above 4000KW : 6 to 6.5</p>		
10.00.00	<p>TYPE TEST</p>		
10.01.00	<p>HT MOTORS</p>		
10.01.01	<p>The contractor shall carry out the type tests as listed in this specification on the equipment to be supplied under this contract. The bidder shall indicate the charges for each of these type tests separately in the relevant schedule of Section - VII- (BPS) and the same shall be considered for the evaluation of the bids. The type tests charges shall be paid only for the test(s) actually conducted successfully under this contract and upon certification by the employer's engineer.</p>		
10.01.02	<p>The type tests shall be carried out in presence of the employer's representative, for which minimum 15 days notice shall be given by the contractor. The contractor shall obtain the employer's approval for the type test procedure before conducting the type test. The type test procedure shall clearly specify the test set-up, instruments to be used, procedure,</p>		
<p>NORTH KARANPURA STPP (3 X 660 MW) EPC PACKAGE</p>	<p>TECHNICAL SPECIFICATIONS SECTION VI, PART-B BID DOC. NO.:CS-4410-001-2</p>	<p>SUB SECTION B-07 MOTORS</p>	<p>Page 5 of 9</p>

CLAUSE NO.	TECHNICAL REQUIREMENTS			
<p>10.01.03</p> <p>10.01.04</p> <p>10.01.05</p>	<p>acceptance norms, recording of different parameters, interval of recording, precautions to be taken etc. for the type test(s) to be carried out.</p> <p>In case the contractor has conducted such specified type test(s) within last ten years as on the date of bid opening, he may submit during detailed engineering the type test reports to the Employer for waiver of conductance of such test(s). These reports should be for the tests conducted on the equipment similar to those proposed to be supplied under this contract and test(s) should have been either conducted at an independent laboratory or should have been witnessed by a client. The Employer reserves the right to waive conducting of any or all the specified type test(s) under this contract. In case type tests are waived, the type test charges shall not be payable to the contractor.</p> <p>Further the Contractor shall only submit the reports of the type tests as listed in "LIST OF TESTS FOR WHICH REPORTS HAVE TO BE SUBMITTED" and carried out within last ten years from the date of bid opening. These reports</p> <p>should be for the test conducted on the equipment similar to those proposed to be supplied under this contract and the test(s) should have been either conducted at an independent laboratory or should have been witnessed by a client. However if the contractor is not able to submit report of the type test(s) conducted within last ten years from the date of bid opening, or in the case of type test report(s) are not found to be meeting the specification requirements, the contractor shall conduct all such tests under this contract at no additional cost to the Employer either at third party lab or in presence of client/Employers representative and submit the reports for approval.</p> <p>LIST OF TYPE TESTS TO BE CONDUCTED</p> <p>The following type tests shall be conducted on each type and rating of HT motor</p> <p>(a) No load saturation and loss curves upto approximately 115% of rated voltage</p> <p>(b) Measurement of noise at no load.</p> <p>(c) Momentary excess torque test (subject to test bed constraint).</p> <p>(d) Full load test(subject to test bed constraint)</p> <p>(e) Temperature rise test at rated conditions. During heat run test, bearing temp., winding temp., coolant flow and its temp. shall also be measured. In case the temperature rise test is carried at load other than rated load, specific approval for the test method and procedure is required to be obtained. Wherever ETD's are provided, the temperature shall be measured by ETD's also for the record purpose.</p>			
<p>NORTH KARANPURA STPP (3 X 660 MW) EPC PACKAGE</p>	<p>TECHNICAL SPECIFICATIONS SECTION VI, PART-B BID DOC. NO.:CS-4410-001-2</p>	<p>SUB SECTION B-07 MOTORS</p>	<p>Page 6 of 9</p>	

CLAUSE NO.	TECHNICAL REQUIREMENTS			
10.01.06	<p>LIST OF TESTS FOR WHICH REPORTS HAVE TO BE SUBMITTED</p> <p>The following type test reports shall be submitted for each type and rating of HT motor</p> <ul style="list-style-type: none"> (a) Degree of protection test for the enclosure followed by IR, HV and no load run test. (b) Terminal box-fault level withstand test for each type of terminal box of HT motors only. (c) Lightning Impulse withstand test on the sample coil shall be as per clause no. 4.3 IEC-60034, part-15 (d) Surge-withstand test on interturn insulation shall be as per clause no. 4.2 of IEC 60034, part-15 			
10.02.00	<p>LT Motors</p>			
10.02.01	<p>LT Motors supplied shall be of type tested design. During detailed engineering, the contractor shall submit for Employer's approval the reports of all the type tests as listed in this specification and carried out within last <i>ten</i> years from the date of bid opening. These reports should be for the test conducted on the equipment similar to those proposed to be supplied under this contract and the test(s) should have been either conducted at an independent laboratory or should have been witnessed by a client.</p>			
10.02.02	<p>However if the contractor is not able to submit report of the type test(s) conducted within last ten years from the date of bid opening, or in the case of type test report(s) are not found to be meeting the specification requirements, the contractor shall conduct all such tests under this contract at no additional cost to the Employer either at third party lab or in presence of client/Employers representative and submit the reports for approval.</p>			
10.02.03	<p>LIST OF TESTS FOR WHICH REPORTS HAVE TO BE SUBMITTED</p> <p>The following type test reports shall be submitted for each type and rating of LT motor of above 50 KW only</p> <ul style="list-style-type: none"> 1. Measurement of resistance of windings of stator and wound rotor. 2. No load test at rated voltage to determine input current power and speed 3. Open circuit voltage ratio of wound rotor motors (in case of Slip ring motors) 4. Full load test to determine efficiency power factor and slip . 5. Temperature rise test . 6. Momentary excess torque test. 7. High voltage test . 			
<p>NORTH KARANPURA STPP (3 X 660 MW) EPC PACKAGE</p>	<p>TECHNICAL SPECIFICATIONS SECTION VI, PART-B BID DOC. NO.:CS-4410-001-2</p>	<p>SUB SECTION B-07 MOTORS</p>	<p>Page 7 of 9</p>	


<p>10.03.00</p> <p>10.04.00</p>	<p>8. Test for vibration severity of motor.</p> <p>9. Test for noise levels of motor(Shall be limited as per clause no 7.06.00 of this section)</p> <p>10. Test for degree of protection and</p> <p>11. Over speed test.</p> <p>12. Type test reports for motors located in fuel oil area having flame proof enclosures as per IS 2148 / IEC 60079-1</p> <p>All acceptance and routine tests as per the specification and relevant standards shall be carried out. Charges for these shall be deemed to be included in the equipment price.</p> <p>The type test reports once approved for any projects shall be treated as reference. For subsequent projects of NTPC, an endorsement sheet will be furnished by the manufacturer confirming similarity and “No design Change”. Minor changes if any shall be highlighted on the endorsement sheet.</p> <p style="text-align: center;">TABLE - I</p> <p style="text-align: center;">DIMENSIONS OF TERMINAL BOXES FOR LV MOTORS</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Motor MCR in KW</th> <th style="text-align: right;">Minimum distance between centre of stud and gland plate in mm</th> </tr> </thead> <tbody> <tr> <td>UP to 3 KW</td> <td style="text-align: right;">As per manufacturer's practice.</td> </tr> <tr> <td>Above 3 KW - upto 7 KW</td> <td style="text-align: right;">85</td> </tr> <tr> <td>Above 7 KW - upto 13 KW</td> <td style="text-align: right;">115</td> </tr> <tr> <td>Above 13 KW - upto 24 KW</td> <td style="text-align: right;">167</td> </tr> <tr> <td>Above 24 KW - upto 37 KW</td> <td style="text-align: right;">196</td> </tr> <tr> <td>Above 37 KW - upto 55 KW</td> <td style="text-align: right;">249</td> </tr> <tr> <td>Above 55 KW - upto 90 KW</td> <td style="text-align: right;">277</td> </tr> <tr> <td>Above 90 KW - upto 125 KW</td> <td style="text-align: right;">331</td> </tr> <tr> <td>Above 125 KW-upto 200 KW</td> <td style="text-align: right;">203</td> </tr> </tbody> </table> <p>For HT motors the distance between gland plate and the terminal studs shall not be less than 500 mm.</p>	Motor MCR in KW	Minimum distance between centre of stud and gland plate in mm	UP to 3 KW	As per manufacturer's practice.	Above 3 KW - upto 7 KW	85	Above 7 KW - upto 13 KW	115	Above 13 KW - upto 24 KW	167	Above 24 KW - upto 37 KW	196	Above 37 KW - upto 55 KW	249	Above 55 KW - upto 90 KW	277	Above 90 KW - upto 125 KW	331	Above 125 KW-upto 200 KW	203
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CLAUSE NO.	TECHNICAL REQUIREMENTS											
	<p>PHASE TO PHASE/ PHASE TO EARTH AIR CLEARANCE:</p> <p>NOTE: Minimum inter-phase and phase-earth air clearances for LT motors with lugs installed shall be as follows:</p> <table border="1" data-bbox="363 461 1075 719"> <thead> <tr> <th>Motor MCR in KW</th> <th>Clearance</th> </tr> </thead> <tbody> <tr> <td>UP to 110 KW</td> <td>10mm</td> </tr> <tr> <td>Above 110 KW and upto 150 KW</td> <td>12.5mm</td> </tr> <tr> <td>Above 150 KW</td> <td>19mm</td> </tr> </tbody> </table>			Motor MCR in KW	Clearance	UP to 110 KW	10mm	Above 110 KW and upto 150 KW	12.5mm	Above 150 KW	19mm	
Motor MCR in KW	Clearance											
UP to 110 KW	10mm											
Above 110 KW and upto 150 KW	12.5mm											
Above 150 KW	19mm											
<p>NORTH KARANPURA STPP (3 X 660 MW) EPC PACKAGE</p>	<p>TECHNICAL SPECIFICATIONS SECTION VI, PART-B BID DOC. NO.:CS-4410-001-2</p>	<p>SUB SECTION B-07 MOTORS</p>	<p>Page 9 of 9</p>									

SUB-SECTION – B-06
LT SWITCHGEARS

NORTH KARANPURA STPP
(3 X 660 MW)
EPC PACKAGE

TECHNICAL SPECIFICATION
SECTION-VI, PART-B
BID DOC.NO.: CS-4410-001-2

CLAUSE NO.	TECHNICAL REQUIREMENTS			
<p>1.00.00</p> <p>1.01.00</p> <p>1.01.01</p> <p>1.01.02</p>	<p>DESIGN PHILOSOPHY / PRACTICE FOR LV BOARD SIZING</p> <p>The sizing of LV boards shall be primarily dependent on the following conditions such as total load connected onto a Board, diversity factors for various loads connected, Fault Level and Voltage Regulation Considerations.</p> <p>As far as practicable the system shall provide segregated supplies to main and standby auxiliaries so that failure of supply to main auxiliary shall in no way jeopardize the standby auxiliary feed. Automatic changeover at critical switchgear/ MCC sections shall be provided as necessary to prevent the loss of a unit or to ensure the equipment safety.</p> <p>Design Considerations:</p> <p>Sizing of Unit and Station boards</p> <ul style="list-style-type: none"> a) Input KVA for a Drive = (Rating KW X Load Factor) / (Efficiency X Power Factor) where values of load factor , power factor and efficiency are defined below: b) Load (service) factor for 415 V loads is taken as 0.85 c) Power factor 415 V Uni-Directional drives is taken as 0.8 and efficiency as 0.85 d) Power factor of 415 V bidirectional drive Loads is taken as 0.65 and efficiency as 0.8 for motor rating less than 15 KW For motor ratings above 15 KW and above the corresponding values are 0.75 and 0.8. e) The Finally selected Bus Bar ratings for switchboards, MCC s and ACDB and Busduct shall include a 10 % margin over the calculated values. f) The LDB' s shall be considered to be loaded to 70 % of their KVA rating g) A spare capacity of about 10 % shall be kept for addition of loads during detail engineering as many of the LT loads cannot be predicted during the Rating selection of the Board. h) Busbar Ratings of valves/dampers boards shall be derived by summing up to 5% of the total KVA load connected. With the largest Value /damper Connected. i) Welding sockets shall be connected from Welding DBs. j) ESP consumption for 100 % BMCR operation shall be considered and further this load shall be uniformly divided among ESP Switchgears. <p>Sizing of Offsite Boards</p> <ul style="list-style-type: none"> a) The loads for mechanical auxiliary systems shall be met by auxiliary transformers based on the criteria that each switchgear/MCC/Distribution board shall be fed either by 2x100% or 3x50% transformers/feeders and, these shall be rated to carry the maximum load expected to be imposed. Each of the above boards shall be sectionalized. b) The sizing of Unit Emergency boards shall be in according to the DG rating. The Emergency board shall have tie to both sections of Unit Service Switchgear for catering unit loads in Blackout Conditions. 			
<p>NORTH KARANPURA STPP (3 X 660 MW) EPC PACKAGE</p>	<p>TECHNICAL SPECIFICATIONS SECTION VI, PART-B BID DOC. NO.:CS-4410-001-2</p>	<p>SUB SECTION B-06 LT SWITCHGEARS & LT BUSDUCT</p>	<p>PAGE 1 OF 71</p>	


CLAUSE NO.	TECHNICAL REQUIREMENTS			
1.02.00	<p>Layout Criteria</p> <p>The switchboards can be split into two sections based on layout constraints in case of long switchboards to optimize Switchgear room layouts. The two sections of the split shall be connected by Bus duct/Cable as per layout requirements.</p>			
1.03.00	<p>Spare capacity and Future Requirements</p> <p>Each of the LV switchboards shall be designed for 1.1 times the required rating as a spare capacity. Further all LV Switchboard shall be provided with 10 % spare modules of each rating and type of module.</p>			
1.04.00	<p>Standardization</p> <p>The LV Boards shall be fed through either LT auxiliary transformers. MCC, and Distributed boards are fed further through these main boards. The Standard rating of the main boards fed through Unit Auxiliary Service and Station Service Transformers shall be 3500 Amp .Other Standard ratings used shall be 3000,2500, 2000 Amp, 1600 Amp, 1000 Amp, 600 Amp, 400 & 250 Amp.</p> <p>Preferred ratings for LV Busduct rating are 3500 Amp, 3000 Amp, 2500 Amp and 1600 amp. It shall be preferred to have all LV Switchboards for the entire plant from a One/Two/Three manufacturer from maintainability and spares management point of view.</p> <p>It shall be preferred to follow a standardization of Terminal Numbers across all LV Modules for ease of Interconnection and standardization.</p>			
1.05.00	<p>Plant control cable Interconnections</p> <p>a) Standard control cable sizes shall preferably be 3CX1.5, 5CX1.5, 7CX1.5 & 10CX1.5 b) Cable size for motor space heater application shall be 2CX2.5 c) Interconnections for Current Transformer terminals shall use two cores of 1.5mm² size per phase d) Core identification shall be using core color for up to 5-core cable and core number for cable with more cores e) Separate control cables shall be used for current transformers. f) At least one spare core shall be made available in each of the control cable</p>			
1.00.00	<p>CODES AND STANDARDS</p>			
1.01.00	<p>All equipment shall, generally, comply with the updated issues of</p> <p>(a.) Applicable Indian Standards</p> <p>(b.) Indian Electricity Act.</p> <p>(c.) Indian electricity rules</p>			
1.02.00	<p>Equipment complying with any other authoritative / internationally recognized standards such as IEC, British, U.S.A., German, etc. will also be considered if it ensures performance equivalent or superior to Indian Standards. In such cases the contractor shall clearly indicate the standard adopted and furnish the copy of latest English version of the same along with the bid and bring out the salient features for comparison.</p>			
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1.03.00


All standards, specifications and codes of practice referred to herein shall be the latest editions including all applicable official amendments and revisions as published one month prior to the date of opening of bids. In case of conflict between this specification and those (IS codes, Standards etc.) referred to herein, the former shall prevail. All work shall be carried out as per the following codes and standards.


IS: 5	Colors for ready-mixed paints and enamels.
IS: 694	PVC insulated cables for working voltages upto and including 1100V.
IS: 722	A.C. Electricity Meters
IS: 1248	Electrical Indicating instruments
IS/IEC: 60947-1	Degree of protection provided by enclosures for low voltage Switchgear and Control gear
IS/IEC: 60947-2	A.C. circuit Breakers
IS: 2551	Danger Notice Plates
IS: 2629	Hot dip galvanising
IS: 2705	Current Transformers
IS/IEC: IEC-60947-4-1	Contactors and motors starter for voltages not exceeding 1000 V AC or 1200 V DC
IS: 3043	Code of practice for earthing.
IS: 3072	Code of practice for installation and maintenance of Switchgear
IS: 3156	Voltage Transformers
IS: 3202	Code of practice for climate proofing of electrical equipment.
IS: 3231	Electrical relays for power system protection.
IS/IEC 60947	Air-Break Switches, air break disconnectors, air break disconnector and fuse combination units for voltages not exceeding 1000V AC or 1200 V DC.

CLAUSE NO.	TECHNICAL REQUIREMENTS			
	IS/IEC 60947-1 / IEC-60947-1	General Requirements for Switchgear and Control gear for voltages not exceeding 1000 V.		
	IS: 5082	Wrought Aluminum and Aluminum alloys for electrical purposes.		
	IS: 6005	Code of practice of phosphating of iron and steel.		
	IS/IEC 60947-5-1 / IEC-60947-5-1	LV switchgear and Control gear Control current devices and switching element.		
	IS: 8623 (3 parts) / IEC: 60439	Specification for factory built assemblies of Switchgear & Control gear for voltages upto and including 1000 V AC & 1200 V DC.		
	IS: 8686	Static Relays		
	IS: 13703 / IEC: 60269	HRC Cartridge fuses		
	IS: 10118 (4 parts)	Code of practice for selection, installation and maintenance of switchgear and control gear.		
	IS: 11171	Specification for dry type transformers.		
	IEC: 60255	Electrical Relays		
	IEC: 61850	Communication networks and systems in substations		
	IS: 11353	Guide for uniform system of marking and identification of conductors and apparatus terminals		
	IS: 12021	Specification of control transformers for switchgear and Control gear for voltage not exceeding 1000V AC.		
	IEC: 60947-7-1	Terminal blocks for copper conductors		
	IS :513 (2008)	Cold Rolled Low Carbon Steel Sheets and Strips		
	IEC 60439(1&2)/ IS 8623(1&2)	Bus trunking system (sandwich busduct)		
NORTH KARANPURA STPP (3 X 660 MW) EPC PACKAGE	TECHNICAL SPECIFICATIONS SECTION VI, PART-B BID DOC. NO.:CS-4410-001-2	SUB SECTION B-06 LT SWITCHGEARS & LT BUSDUCT	PAGE 4 OF 71	

CLAUSE NO.	TECHNICAL REQUIREMENTS			
2.00.00	TECHNICAL PARAMETERS			
2.01.00	POWER SUPPLY			
2.01.01	AC SYSTEM			
	1) Voltage		415 V \pm 10%, 3 Phase, 4 wire, solidly earthed	
	2) Frequency		50 Hz \pm 5%	
	3) Combined variation (in volts & frequency)	(in volts & frequency)	10% absolute sum	
	4) Fault Level		50KA(RMS)	
2.01.02	DC SYSTEM			
	1) System Voltage		240VDC 2-Wire, Unearthed	
	2) Fault Level		20 KA	
2.01.03	CONTROL SUPPLY VOLTAGE			
	1) Trip & closing coil of circuit breaker		240V DC/120V DC	
	2) Spring charging motor		240V DC/120V DC	
	3) MCC control supply		110V AC Neutral solidly earthed	
	4) Space heater & lighting		240V AC Neutral solidly earthed	
2.02.00	CUBICLE DATA			
	Busbar Rating			
	1) Continuous Current rating		As per requirement	
	2) Short time rating where			
	a) CB is used as incomer		50KA(RMS) for one sec	
	b) Fuse protection is used in Incomer		Prospective current of 50KA(RMS) for the fuse clearing time	
NORTH KARANPURA STPP (3 X 660 MW) EPC PACKAGE	TECHNICAL SPECIFICATIONS SECTION VI, PART-B BID DOC. NO.:CS-4410-001-2	SUB SECTION B-06 LT SWITCHGEARS & LT BUSDUCT	PAGE 5 OF 71	

CLAUSE NO.	TECHNICAL REQUIREMENTS		
2.03.00	3) Dynamic Rating where		
	a) CB is used as incomer	105KA(PEAK)	
	b) Fuse Protection is used in incomer	Prospective current of 105KA (PEAK) as limited by fuse	
	4) Busbar insulation		
	a) For switchgear	PVC Sleeve insulated	
	b) For MCC	PVC Sleeve insulated	
	c) ACDB	PVC Sleeve insulated	
	d) DCDB	PVC Sleeve insulated	
	e) For fuse boards	PVC Sleeve insulated/ epoxy coated	
NORTH KARANPURA STPP (3 X 660 MW) EPC PACKAGE	TECHNICAL SPECIFICATIONS SECTION VI, PART-B BID DOC. NO.:CS-4410-001-2	SUB SECTION B-06 LT SWITCHGEARS & LT BUSDUCT	PAGE 6 OF 71

CLAUSE NO.	TECHNICAL REQUIREMENTS			
2.04.00	METERS			
	1) Accuracy class		2.0	
	2) One min. power frequency withstand test voltage		2.0 KV (rms)	
2.05.00	CURRENT TRANSFORMERS			
	1) Type		Cast Resin Bar Primary	
	2) Voltage class and frequency		650 V, 50 HZ	
	3) Class of insulation		E or better	
	4) Accuracy class & burden			
	a) For protection		5P20, 5VA	
			PS Class for REF	
	b) For metering		class 1.0, 5VA (min)	
	5) Short time withstand			
	a) For CT Associated with circuit breaker		50KA(RMS) for 1 sec	
	b) For CT Associated with fuse protected feeders		Prospective current of 50KA(RMS) for the Fuse clearing time	
	6) Dynamic withstand			
	a) For CTs Associated with circuit breaker		105KA(PEAK)	
	b) For CT Associated with fuse protected feeders		Prospective current of 105KA(PEAK) as Limited by fuse	
2.06.00	BUSDUCT			
	1) Type		Non-Segregated	
	2) One minute power frequency withstand voltage		2.5 kV	
NORTH KARANPURA STPP (3 X 660 MW) EPC PACKAGE	TECHNICAL SPECIFICATIONS SECTION VI, PART-B BID DOC. NO.:CS-4410-001-2	SUB SECTION B-06 LT SWITCHGEARS & LT BUSDUCT	PAGE 7 OF 71	

CLAUSE NO.	TECHNICAL REQUIREMENTS			
2.07.00	3)	One second short ckt withstand current	50KA(RMS)	
	4)	Momentary dynamic current withstand	105KA(PEAK)	
	BUSDUCT (SANDWICH TYPE)			
	1)	Type	Bus Trunking	
	2)	Rated Insulation voltage	1000V	
	3)	One second short ckt withstand current	50KA(RMS)	
	4)	Momentary dynamic current withstand	105KA(PEAK)	
	5)	Power frequency withstand voltage	3.5kv	
	6)	Impulse withstand voltage	8kV	
	7)	Insulation	Class F	
	VOLTAGE TRANSFORMERS			
	1)	Type	Cast Resin	
	2)	Voltage Ratio	415 / 110 V for line PT 415/ $\sqrt{3}$ / 110/ $\sqrt{3}$ V for Bus PT	
	3)	Method of Construction	Vee Vee	
4)	Accuracy Class	0.5		
5)	Rated Voltage factor	1.1continuous, 1.5 for 30 sec.		
6)	Class of insulation	E or better		
7)	One minute power frequency withstand voltage	2.5 KV		
NORTH KARANPURA STPP (3 X 660 MW) EPC PACKAGE	TECHNICAL SPECIFICATIONS SECTION VI, PART-B BID DOC. NO.:CS-4410-001-2	SUB SECTION B-06 LT SWITCHGEARS & LT BUSDUCT	PAGE 8 OF 71	