

NTPC LIMITED

1X500 MW VINDHAYACHAL STPS, STAGE-V, UNIT NO.- 13

VOLUME IIB & III

**TECHNICAL SPECIFICATION
FOR
FUEL OIL UNLOADING & STORAGE SYSTEM**

SPECIFICATION NO.: PE-TS-389-166-A001



BHARAT HEAVY ELECTRICALS LTD

**POWER SECTOR PROJECT ENGINEERING MANAGEMENT
PPEI,NOIDA-INDIA**

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1X500MW VINDHAYACHAL STPS, UNIT NO.- 13 (STAGE-V)

**TECHNICAL SPECIFICATION
FOR
FUEL OIL UNLOADING & STORAGE SYSTEM**

VOLUME-IIB

SECTION – A

(INTENT OF SPECIFICATION)



**BHARAT HEAVY ELECTRICALS LTD
POWER SECTOR PROJECT ENGINEERING MANAGEMENT
PPEI,NOIDA-INDIA**



TITLE TECHNICAL SPECIFICATION FOR FUEL OIL UNLOADING & STORAGE SYSTEM 1X500 MW VINDHAYACHAL STPS, STAGE-V	SPECIFICATION NO. PE-TS-389-166-A001	
	VOLUME II B	
	SECTION A	
	REV 00	DATE
	SHEET	OF

1.0 SCOPE OF INQUIRY / INTENT OF SPECIFICATION

- 1.1 The specification is intended to cover design, engineering, manufacture, inspection and testing at vendor's/ sub-vendor's works, painting, forwarding, proper packing and shipment and delivery at site, unloading, handling & transportation at site, Erection & Commissioning including commissioning spares(if applicable), minor civil works as required on FOR site basis, Performance and guarantee testing and handing over of **FUEL OIL UNLOADING & STORAGE SYSTEM** as per details in different sections / volumes of this specification for **1X500MW VINDHAYACHAL STPS STAGE-V, UNIT NO.- 13**.
- 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 of the responsibility of providing such facilities to complete the supply, erection and commissioning of FUEL OIL UNLOADING & STORAGE 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 tenderer 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.



TITLE TECHNICAL SPECIFICATION FOR FUEL OIL UNLOADING & STORAGE SYSTEM 1X500 MW VINDHAYACHAL STPS, STAGE-V	SPECIFICATION NO. PE-TS-389-166-A001	
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- 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 in the enclosed schedule; otherwise, it will be presumed that the vendor's offer is strictly in line with NIT specification.
- 1.9 In case all above requirements are not complied with, the offer may be considered as incomplete and would become liable for rejection.
- 1.10 Unless specified otherwise, all through the specification, the word contractor shall have same meaning as successful bidder /vendor and Customer/ Purchaser/Employer will mean BHEL and /or **NTPC LIMITED** including their consultant as interpreted by BHEL in the relevant context.

1X500MW VINDHAYACHAL STPS, UNIT NO.- 13 (STAGE-V)

**TECHNICAL SPECIFICATION
FOR
FUEL OIL UNLOADING & STORAGE SYSTEM**

VOLUME-IIB

SECTION – B

(PROJECT INFORMATION)




**BHARAT HEAVY ELECTRICALS LTD
POWER SECTOR PROJECT ENGINEERING MANAGEMENT
PPEI,NOIDA-INDIA**




PROJECT INFORMATION


VINDHYAHCAL STPP-V (1X500MW)
STEAM GENERATOR WITH
ELECTROSTATIC PRECIPITATOR PACKAGE

TECHNICAL SPECIFICATION
SECTION-VI
BID DOC. NO.: CS-2260-101-2

CLAUSE NO.	PROJECT INFORMATION																					
1.00.00	INTRODUCTION																					
	<p>BACKGROUND</p> <p>Vindhyachal STPP was conceived as a pit head coal based super thermal power plant of 2260 MW (6x210 MW + 2x500 MW) capacity for which land was acquired during stage-I of the project. The capacity of the project was increased to 3260 MW by adding two units of 500 MW under Stage-III. Additional two units of 500 MW under Stage- IV of the project are under implementation. Further, the capacity of the project was proposed to be increased to 4760 MW by adding one unit of 500 MW under Stage-V. Stage-I, II & III of the project comprising of six units of 210 MW + two units of 500 MW + two units of 500 MW are under commercial operation. Two units of 500 MW under stage IV and one unit of 500 MW under stage V of the project is under implementation. The capacity after implementation of Stage V of the project shall be 4760 MW.</p>																					
2.00.00	<p>CAPACITY</p> <table border="1" data-bbox="343 750 1406 1086"> <thead> <tr> <th>Stage</th> <th>Capacity</th> <th>Status</th> </tr> </thead> <tbody> <tr> <td>I</td> <td>6x210 MW</td> <td>Under Commercial Operation</td> </tr> <tr> <td>II</td> <td>2x500 MW</td> <td>Under Commercial Operation</td> </tr> <tr> <td>III</td> <td>2x500 MW</td> <td>Under Commercial Operation</td> </tr> <tr> <td>IV</td> <td>2x500 MW</td> <td>Presently under implementation</td> </tr> <tr> <td>V</td> <td>1x500 MW</td> <td>Presently under implementation</td> </tr> </tbody> </table>				Stage	Capacity	Status	I	6x210 MW	Under Commercial Operation	II	2x500 MW	Under Commercial Operation	III	2x500 MW	Under Commercial Operation	IV	2x500 MW	Presently under implementation	V	1x500 MW	Presently under implementation
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IV	2x500 MW	Presently under implementation																				
V	1x500 MW	Presently under implementation																				
3.00.00	<p>LOCATION AND APPROACH</p> <p>The proposed power station is located in Singrauli district of Madhya Pradesh, having a latitude and longitude of 24° 06' N and 82° 40' E respectively. The site is situated on the North-Western bank of Rihand Reservoir and is confined within the boundaries of Singrauli STPP discharge channel towards South, Ballia nallah towards East, power corridor of SSTPP and Jayant Mine Township towards North. Renukoot, the nearest town, is about 50 kms. away from the project site. The approach road for Vindhyachal STPP has been drawn from the peripheral road of Singrauli STPP.</p> <p>The nearest rail head Shakti Nagar Railway Station, is approximately 2.0 km away from the project site.</p> <p>Airport The nearest airport is Varanasi located at a distance of approximately 220 km from the project site.</p> <p>The vicinity plan of the project site is placed at Annexure A-1.</p> <p>Major road and road distance from the project site are as under:</p> <table border="1" data-bbox="343 1713 1406 1982"> <thead> <tr> <th>Between Stations</th> <th>By Road (kms)</th> <th>By Rail (kms)</th> </tr> </thead> <tbody> <tr> <td>Vindhyachal-Lucknow</td> <td>435</td> <td>475</td> </tr> <tr> <td>Vindhyachal-New Delhi</td> <td>850</td> <td>925</td> </tr> <tr> <td>Vindhyachal- Sidhi</td> <td>095</td> <td>-</td> </tr> <tr> <td>Vindhyachal-Bhopal</td> <td>610</td> <td>590</td> </tr> </tbody> </table>				Between Stations	By Road (kms)	By Rail (kms)	Vindhyachal-Lucknow	435	475	Vindhyachal-New Delhi	850	925	Vindhyachal- Sidhi	095	-	Vindhyachal-Bhopal	610	590			
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VINDHYACHAL STPP-V(1X500MW) STEAM GENERATOR WITH ELECTROSTATIC PRECIPITATOR PACKAGE	TECHNICAL SPECIFICATION SECTION-VI BID DOC. NO.: CS-2260-101-2	PART-A SUB-SECTION-II PROJECT INFORMATION	PAGE 1 OF 12																			

CLAUSE NO.	PROJECT INFORMATION		
4.00.00	<p>LAND</p> <p>A total area of 5378 acres of land was acquired for the project during implementation of Stage-I. The plant facilities and township for this project would be accommodated in the land acquired during Stage-I of the project. However, for ash dyke, approximately 260 acres of land is proposed to be acquired.</p>		
5.00.00	<p>WATER</p> <p>The source of raw water for the project is hot water Discharge channel of CW System of Singrauli STPP as that of in existing Stage-I, II, III & IV of Vindhyachal STPP.</p> <p>Raw water is proposed to be used for meeting the complete water requirement of the project. Normal Make up water requirement for this project would be about 1800 m³/hr with ash water re-circulation system and 2800 m³/hr with once thru system.</p> <p>The total committed for the project is 180 Cusecs and the same has been duly concurred by CWC. The make-up water requirement of Stage-V will be about 20 Cusecs which shall be met from surplus water available within existing commitment.</p>		
6.00.00	<p>COAL AVAILABILITY AND LINKAGE</p> <p>Coal requirement for Vindhyachal STPP, Stage-I, II & III is presently being met from Northern Coalfields Ltd. (NCL). The coal requirement for one 500 MW Unit shall be about 2.7 MTPA at 90% PLF. For FR purposes, coal from NCL has been considered.</p> <p>Application for accord of long-term coal linkage has been submitted to Ministry of Coal vide dated 17.11.08</p>		
7.00.00	<p>COAL TRANSPORTATION</p> <p>Coal requirement for Stage-V shall be met from Stage-IV itself. Accordingly Stage-IV CHP capacity has been selected as 2000 MTPH. Coal input to Stage-IV & Stage V may be from BOBR or BOX N wagons.</p>		
8.00.00	<p>RAILWAY SIDING</p> <p>For bringing the equipment and material to the power house through rail, a permanent railway siding has already been constructed during Stage-I, II&III. This siding is proposed to be extended upto Stage-V of the project to provide rail access to unloading bays and transformer yard.</p>		
9.00.00	<p>METEOROLOGICAL DATA</p> <p>Important meteorological data from nearest observatory at Sidhi is placed at Annexure A-II.</p>		
10.00.00	<p>PLANT WATER SCHEME</p> <p>The Plant water scheme is described below.</p>		
11.00.00	<p>CONDENSER COOLING (CW) WATER SYSTEM</p> <p>It is proposed to provide recirculating type CW system with induced draft type cooling towers, Raw water for Stage – V of this project shall be pumped from the hot water (CW system) discharge channel of Singrauli Project of NTPC to Water pretreatment Plant. The treated clarified water shall be pumped to the hot water discharge ducts of Stage – V circulating Water (CW) system at the upstream of cooling towers as make up to the system. It is</p>		
<p>VINDHYACHAL STPP-V(1X500MW) STEAM GENERATOR WITH ELECTROSTATIC PRECIPITATOR PACKAGE</p>	<p>TECHNICAL SPECIFICATION SECTION-VI BID DOC. NO.: CS-2260-101-2</p>	<p>PART-A SUB-SECTION-II PROJECT INFORMATION</p>	<p>PAGE 2 OF 12</p>

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	<p>proposed to operate the CW system at a C.O.C. of about 4 and chemical treatment programme (using acid dosing and scale cum corrosion inhibitors dosing) shall be employed in addition to blow down of CW water to control the CW system water chemistry. The expected circulating water analysis is given in Annexure A-III of the Sub-section.</p>			
12.00.00	<p>EQUIPMENT COOLING WATER (ECW) SYSTEM (UNIT AUXILIARIES)</p> <p>The plant auxiliaries of Steam Generator shall be cooled by Demineralised water (DM) in a closed circuit. The primary circuit DM water shall be cooled through plate type heat exchangers by Circulating Water tapped from CW system in a closed secondary circuit. The hot secondary circuit cooling water shall be cooled in the cooling towers and shall be returned back to the system.</p>			
13.00.00	<p>ASH WATER SYSTEM</p> <p>(a) It is proposed to operate ash water system in a closed circuit. The ash water from the ash dyke shall be recirculated. During re-circulation mode, the make up to the ash water system (to compensate for the ash water blow down and evaporation loss in ash dyke) shall be supplied from CW blow down.</p> <p>(b) During initial operating stage of the project, when decanted ash water is not available from the dyke, the ash water system shall be operated in once through mode. The make-up water to ash water system shall be pumped from the raw water (from the discharge channel of Singrauli station) source and CW blow down water.</p> <p>(c) Considering total ash handling plant water requirement of 1100 Cu.M/hr. for slurry formation during re-circulation mode operation, it is expected that about 970 M³/hr of decanted ash water shall return to the ash handling system after accounting for evaporation loss.</p> <p>d) The quality of raw water is given at Annexure A-III.</p>			
14.00.00	<p>OTHER MISCELLANEOUS WATER SYSTEMS</p> <p>(a) CW system blow down water shall be used for dust suppression system of coal handling plant, ash slurry pumps sealing, make-up to ash handling plant, make-up to fire water storage tanks and cooling water requirement of hydrogen generation plant. The service (wash water) 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. The excess service water shall be led to central monitoring basin for disposal.</p> <p>(b) Separate water Pre-treatment plants are proposed for Circulating water (PT-CW) system and Demineralization Plant (PT-CW) plant</p> <p>(c) It is proposed to provide a DM plant for this stage of the project. From the proposed DM plant, DM water shall be pumped to meet the Steam Cycle make-up water requirement, makeup the hydrogen generation plant and makeup to the primary circuit of ECW (unit auxiliaries) system, boiler fill water shall be provided from Dematerializing plant. In addition, separate set of boiler fill pumps shall be provided to fill the boiler from these DM water storage tanks, DM water required for regeneration of condensate polishing plant and resin transfer operation shall also be provided by these tanks.</p>			
<p>VINDHYACHAL STPP-V(1X500MW) STEAM GENERATOR WITH ELECTROSTATIC PRECIPITATOR PACKAGE</p>	<p>TECHNICAL SPECIFICATION SECTION-VI BID DOC. NO.: CS-2260-101-2</p>	<p>PART-A SUB-SECTION-II PROJECT INFORMATION</p>	<p>PAGE 3 OF 12.</p>	

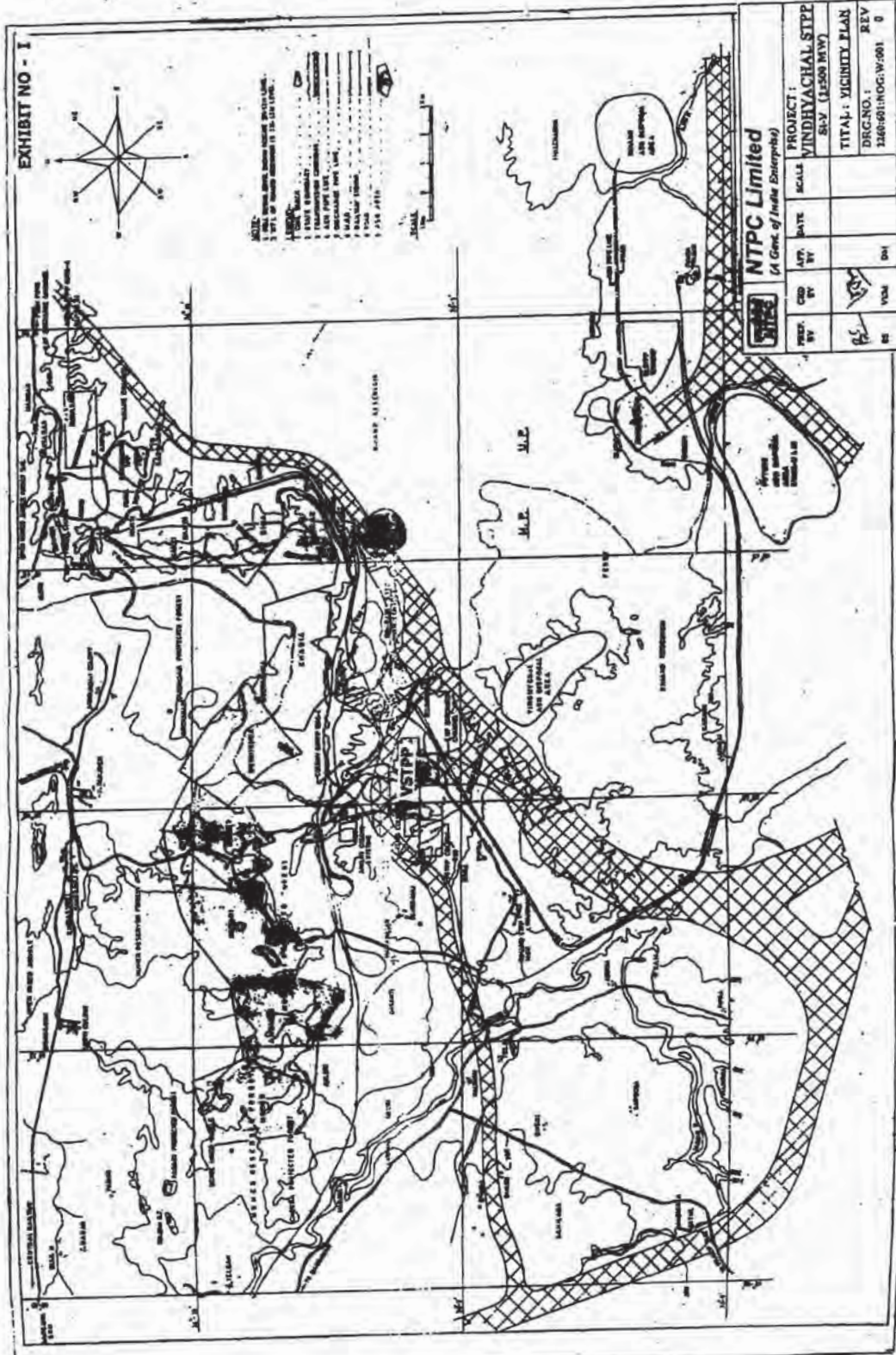
CLAUSE NO.	PROJECT INFORMATION				
<p>15.00.00</p> <p>16.00.00</p>	<p>(d) The quality of filtered (potable) water and DM water is given in Annexure – A-III of this sub-section.</p> <p>Criteria for Wind Resistant Design of Structures and Equipment</p> <p>All structures and equipment of the power plant, including plant auxiliary structures and equipment, shall be designed for wind forces as given in Sub-Section-V, Part-B, Section-VI, i.e. Technical Specification for Civil and Structural Works.</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 Sub-Section-V, Part-B, Section-VI, i.e. Technical Specification for Civil and Structural Works.</p>	<p>VINDHYACHAL STPP-V(1X500MW) STEAM GENERATOR WITH ELECTROSTATIC PRECIPITATOR PACKAGE</p>	<p>TECHNICAL SPECIFICATION SECTION-VI BID DOC. NO.: CS-2260-101-2</p>	<p>PART-A SUB-SECTION-II PROJECT INFORMATION</p>	<p>PAGE 4 OF 12</p>

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PROJECT INFORMATION



ANNEXURE A-I
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VINDHYACHAL STTP-V(1X500MW)
STEAM GENERATOR WITH ELECTROSTATIC
PRECIPITATOR PACKAGE

TECHNICAL SPECIFICATION
SECTION-VI
BID DOC. NO.: CS-2260-101-2

PART-A
SUB-SECTION-II
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PROJECT INFORMATION



ANNEXURE A-II
Page 1 of 2

जलवायवी सारणी
CLIMATOLOGICAL TABLE

1958 से 1980 तक के मासिक व वार्षिक
BASED ON OBSERVATIONS FROM 1958 TO 1980

स्थान : सिद्धी
STATION : Siddhi
LAT 24°25' N LONG 81°52' E
ऊँचाई : 272 METRES
HEIGHT ABOVE M. S. L.

MONTH	MEAN				EXTREMES		HUMIDITY		CLOUD AMOUNT		RAINFALL		MEAN WIND SPEED (kmph)						
	DRY BULB °C	WET BULB °C	DAILY MAX °C	DAILY MIN °C	HIGHEST °C	LOWEST °C	RELATIVE HUMIDITY %	VAPOUR PRESSURE mm	ALL CLOUDS	LOW CLOUDS	MONTHLY TOTAL mm	NO. OF RAINY DAYS		TOTAL IN MONTH WITH YEAR	HEAVICEST FALL IN 24 HOURS	DATE AND YEAR			
JAN	12.2	10.1	24.3	8.1	29.1	3.5	32.8	21	1.0	17	1962	78	10.8	1.2	0.8	21	49.4	1971	
FEB	15.9	12.4	27.6	10.8	32.8	5.3	36.0	28	2.0	10	1974	68	12.1	1.1	0.7	18.4	1.7	34.4	1971
MAR	22.0	15.8	33.4	15.5	38.4	10.0	41.2	30	4.8	10	1972	51	12.1	0.8	0.5	13.2	1.0	30.2	1963
APR	28.1	19.5	39.1	21.8	43.4	16.5	48.8	10	11.8	01	1966	38	15.0	0.5	0.3	3.4	0.5	17.7	1965
MAY	33.1	22.0	42.0	25.8	45.1	21.2	46.0	28	17.0	09	1960	35	17.5	0.8	0.5	8.8	0.8	37.0	1971
JUN	31.8	25.0	38.2	27.5	44.2	23.4	47.4	09	20.0	27	1968	58	26.4	2.7	1.7	132.5	8.3	575.3	1965
JUL	35.5	25.4	35.5	25.1	37.8	22.7	42.2	01	17.0	22	1969	83	30.8	5.2	3.2	338.2	15.0	584.8	1968
AUG	27.5	25.5	31.7	24.8	34.9	22.6	38.8	03	17.4	04	1968	85	30.7	5.3	3.4	325.2	14.9	620.1	1967
SEP	28.9	25.9	32.3	23.8	35.5	21.1	39.0	11	18.2	27	1972	72	28.6	4.8	3.1	211.8	9.2	498.1	1970
OCT	24.4	21.0	32.8	19.4	35.0	14.8	36.4	05	12.2	31	1964	73	22.4	1.6	1.0	35.4	2.2	138.8	1968
NOV	18.5	15.3	29.8	13.0	32.8	8.7	35.9	04	4.0	30	1970	69	14.9	0.8	0.5	12.1	0.7	118.0	1969
DEC	13.4	11.1	25.3	8.3	28.7	4.0	31.2	31	1.0	27	1961	74	11.5	0.5	0.4	7.7	0.7	39.8	1968
ANNUAL TOTAL OR MEAN	23.5	19.0	32.5	16.8	45.5	2.9	48.6	06	19.5	2.1	1.3	112.7	55.0	208.2	505.5	189.8	1971	1965	
WIND NUMBER OF YEARS	21	23	23	23	22	23	23	23	23	22	21	23	23	23	23	23	23	23	22

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PROJECT INFORMATION



ANNEXURE – A-III
Sheet 1 of 5

COOLING WATER ANALYSIS

	Constituent	as	mg per litre
1.	Calcium	CaCO ₃	148.0
2.	Magnesium	CaCO ₃	37.5
3.	Sodium & Potassium	CaCO ₃	47.5
4.	Bicarbonate	CaCO ₃	104.5
5.	Chloride	CaCO ₃	47.5
6.	Sulphate	CaCO ₃	81.0
7.	Carbonate	CaCO ₃	0
8.	Silica	SiO ₂	25.0
9.	Iron	Fe	.75
10.	pH Value	-	7.6-7.9
11.	Turbidity	NTU	50

Note: The C.W system is expected to operate at about 4.0 Cycles of Concentration.

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PROJECT INFORMATION



ANNEXURE – A-III
Sheet 2 of 5

RAW WATER ANALYSIS

	Constituent	as	mg per litre
1.	Calcium	CaCO ₃	34.0
2.	Magnesium	CaCO ₃	15.0
3.	Sodium & Potassium	CaCO ₃	19.0
4.	Bicarbonate	CaCO ₃	46.0
5.	Chloride	CaCO ₃	12.0
6.	Sulphate	CaCO ₃	10.0
7.	Carbonate	CaCO ₃	0
8.	Silica	SiO ₂	10.0
9.	Iron	Fe	2.0
10.	pH Value	-	7.6-8.2
11.	Turbidity	NTU	Upto 1000
12.	Temperature (°C)		43

Note: Raw water from hot water channel of Singrauli STPP

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PROJECT INFORMATION



ANNEXURE – A-III
Sheet 3 of 5

CLARIFIED WATER ANALYSIS

	Constituent	as	mg per litre
1.	Calcium	CaCO ₃	59.2
2.	Magnesium	CaCO ₃	15.0
3.	Sodium & Potassium	CaCO ₃	19.0
4.	Bicarbonate	CaCO ₃	41.7
5.	Chloride	CaCO ₃	19.0
6.	Sulphate	CaCO ₃	32.5
7.	Carbonate	CaCO ₃	0
8.	Silica	SiO ₂	10.0
9.	Iron	Fe	.0.30
10.	pH Value	-	7.6-8.2
11.	Turbidity	NTU	10
12.	Temperature (°C)		43

Note: At the outlet of clarifier of PT Plant

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PROJECT INFORMATION



ANNEXURE – A-III
Sheet 4 of 5

FILTERED WATER ANALYSIS (Drinking Water)

	Constituent	as	mg per litre
1.	Calcium	CaCO ₃	59.2
2.	Magnesium	CaCO ₃	15.0
3.	Sodium & Potassium	CaCO ₃	19.0
4.	Bicarbonate	CaCO ₃	41.7
5.	Chloride	CaCO ₃	19.0
6.	Sulphate	CaCO ₃	32.5
7.	Carbonate	CaCO ₃	0
8.	Silica	SiO ₂	10.0
9.	Iron	Fe	0.30
10.	pH Value	-	7.5-7.7
11.	Turbidity	NTU	2

VINDHYACHAL STPP-V(1X500MW)
STEAM GENERATOR WITH ELECTROSTATIC
PRECIPITATOR PACKAGE

TECHNICAL SPECIFICATION
SECTION-VI
BID DOC. NO.: CS-2260-101-2

PART-A
SUB-SECTION-II
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ANNEXURE – A-III
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ANALYSIS OF DM WATER TO BE USED
FOR
MAKE-UP WATER TO CONDENSER

Sl. No.	Characteristics		Value
1.	Silica (Max.)	-	0.02 ppm as SiO ₂
2.	Iron as Fe	-	Nil
3.	Total hardness	-	Nil
4.	pH value	-	6.8 to 7.2
5.	Conductivity	-	Not more than 0.1 excluding the effects of free CO ₂

1X500MW VINDHAYACHAL STPP,
STAGE-V, UNIT NO.-13

**TECHNICAL SPECIFICATION
FOR
FUEL OIL UNLOADING & STORAGE
SYSTEM**

**VOLUME-IIB
SECTION-C
(SPECIFIC TECHNICAL REQUIREMENT)**



**BHARAT HEAVY ELECTRICALS LTD.
POWER SECTOR PROJECT ENGINEERING MANAGEMENT
PPEI, NOIDA-INDIA**



**TECHNICAL SPECIFICATION FOR
FUEL OIL HANDLING SYSTEM
1X500MW VINDHAYACHAL STPP, STAGE- V**

SPECIFICATION NO. PE-TS-389-166-A001

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1.0.0 SCOPE OF WORK

Design, engineering, manufacture, inspection and testing at vendor's/ sub-vendor's works, painting, forwarding, proper packing, shipment and delivery at site, unloading, handling & transportation at site, Erection & Commissioning, minor civil works as required, Performance and guarantee testing and handing over of Fuel Oil System shall be as per details in different sections of this specification.

P&I Diagrams and write-up for Fuel Oil Handling System (for tender purpose) is enclosed with the specification. Detailed P&I Diagrams, System write up & Control philosophy shall be furnished by the successful bidder during detail engineering & the same shall be subject to customer approval without any commercial implication.

1.1.0 SCOPE OF SUPPLY

Scope of supply by bidder shall comprise of but not necessarily limited to the following. P&I Diagrams mentioned in clause No. 15 of this section may plz be referred.

- A. One(1) no. fixed roof type M.S. Storage tank of LDO as per IS 803 having dimension as (dia.14.0 M dia x9.0M ht from tank bottom to bottom of overflow nozzle) as per details indicated in NTPC specification.
- B. One no level indicator (Float & Arrow type) & 1 Nos level transmitter of Ultrasonic type mounted on LDO storage tank
- C. Five(5) nos 80NB LDO unloading hoses with isolation valve
- D. Two(2) no Motor operated ball valve as tank isolation valves- One no. each at tank inlet and at tank outlet. This isolation valve shall be located inside the tank dyke. The MOV actuator shall be of flame proof design.
- E. All piping, valves, fittings etc within terminal points.
- F. Relocation of existing unloading header and Pipe and pipe fittings with isolation valves required for the same.
- G. Interconnection of new LDO tank with existing unloading pumps discharge.
- H. Items required for achieving control and monitoring as per relevant clauses mentioned elsewhere in specification.
- I. All foundation bolts/ anchor bolts required for any equipment foundation under the package.

1.2.0 SCOPE OF SERVICES

Scope of services by bidder will include but not necessarily limited to the following:

- a. Unloading, Storage, handling and transportation at site.
- b. Minor civil work like chipping of foundation, grouting below base plate for all structures, equipment, grouting of anchor bolts wherever these are not placed in the foundation during casting of foundation itself, excavation & filling of earth for buried MS pipes if and as required. To the extent possible, vendor shall ensure to supply all foundation bolts timely so as to facilitate placement of these bolts while casting the foundation.
- c. Pre- Commissioning work such as flushing, hydraulic testing etc. Necessary consumables and instrumentation as required for inspection and testing at works as well as at site including pre-commissioning activities shall be arranged by the successful bidder at their own cost.
- d. Erection & Commissioning of Fuel Oil Unloading & Storage System with modification in existing unloading header and unloading pump discharges piping.



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- e. Erection of all foundation bolts/ anchor bolts etc. as required for any equipment. In case these are not erected when foundation is being cast refer point no b above.
- f. Inspection & testing, Performance Requirements and Performance Guarantees.
- g. Painting of tank and all other items within scope of supply.
- h. Making Good/Repairing/replacement of and damaged done by bidder to adjacent structure, pipes etc. while erecting equipment's related to Fuel Oil system
- i. Electrical scope as per enclosure elsewhere in the specification
- j. Preparation of drawing showing common facilities, if any, between BHEL & Vendor supplied equipment.
- k. Preparation of civil assignment drawings i.e. pedestals details, insert plates / embedment's plates required for supporting pipes and equipment etc. and review of civil drawing prepared by customer based on civil assignment drawing of bidder. In case any modification is required in the civil work already done based on civil inputs given by vendor, rework shall be done at the cost and risk of the vendor.
- l. Preparation of all drawings as per list enclosed under Annexure IX.
- m. Preparation of all necessary drawings/data/ documents for obtaining necessary Approval of statutory authorities like PESO , IBR , Weight & Measures Department and any other agency/ competent authority related to installation of Fuel Oil Handling System on behalf of the customer. Successful bidder shall inform customer well in advance requirement of authority letter along with format for the same. After issuance of authority letter by customer, it will be vendor's responsibility to regularly follow up with the concerned authorities to obtain timely approval from these authorities. Any delay on account of the same, unless any specific information related to above approval to be furnished by customer is delayed by customer, shall be to vendor's account and shall not be used as a reason for extension in contract completion.
- n. Layout drawing to be prepared for statutory approval apart from showing the technical requirements shall necessarily show key plan showing approach to site with mile stone, Survey No., Khesra No, Plot No. etc.
- o. Supply of temporary equipment and services for chemical cleaning, steam blowing, energisation, testing etc as applicable.
- p. Training of plant Owner's personnel, O&M operators' personnel on plant operation and maintenance.
- q. All other facilities/ services as described in section on site services in TCE specification and related to Fuel Oil Handling System scope of work within terminal point.
- r. Relevant requirements as per GTR, GCC, ECC & SCC.

Any other service required for making the installation complete in all respect within battery limits and for satisfactory erection & commissioning of the system as well as to meet any statutory requirement relevant to the package, unless specifically EXCLUDED from scope of services.



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- Fuel oil (LDO) : **Towards oil unloading & Storage tank side:**
- Outlet of fuel oil unloading road tanker nozzle
 - Existing unloading pump suction & discharge header outside the Pump House
- Towards P&H Unit Size:**
- Up to 0.5 meter outside the Pump House near the LDO pressurizing pumps for stage-V located in stage-III PH. Further piping up to pressuring pumps & up to boiler will be by other units of BHEL. Temperature- Ambient; Pressure – 1.0 Kg/cm² (a)
Bidder to plan the layout and size the pipe between storage tank and P&H unit in a manner so as to ensure availability of above TP pressure of 1.0 Kg/cm² (a) limiting tank foundation height for storage tanks to 1 m and the P&H unit FFL Approx 500 mm above ground level
 - From Return of Pressurizing Pump– From 500mm outside P&H unit shed, Pressure – 3.0 kg/cm² (g); Elevation- Approx 4 m above P&H unit FFL
- Equipment & line drain for LDO and Storage tank drains for LDO.** : Equipment and line drain for LDO unloading pumps, tank drain for LDO tanks shall be terminated by the bidder in the drain oil tank (existing) located in LDO unloading cum P&H unit building / shed of stage-III.
- Instrument Air** : Bidder have to take from the existing (stage-III) Pump House
- Drain from dyke area** : To OWS (existing, stage-III) during normal condition & to plant drain during rainy season through two way valve pit. Valves in the valve pit along with limit switch for the same are included in bidder's scope.

Change in location of terminal points by up to 50 meters in plan view and 10 m in elevation view shall have no price implication. Isolation valves at the terminal points shall be in the scope of the bidder.

Wherever exact coordinate of TP is not given, bidder to consider location at specified distance from the respective facilities from where distance in bidder's scope will be maximum.



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3.0.0 EXCLUSION

- a) Civil work for fuel oil unloading & storage system including
- I. Road tanker unloading platform
 - II. Tank foundations
 - III. Unloading Pump House
 - IV. Dyke wall and barbed fencing
 - V. Encasing of buried pipes, providing culvert for the same, if required.
 - VI. Hume Pipes, if any
 - VII. Civil works like pits, wherever required.
 - VIII. Handrails other than those on the storage tanks.
 - IX. Various cable & pipe trenches, pipe pedestals, drains, sumps, insert plates for pedestals for pipe supports.

However, location, sizing and loads, top of concrete elevations, top of grout elevations etc. and any other input related to above as applicable for above shall be given by the vendor.

- b) Fire Protection system for storage tanks,
- c) Air Conditioning / ventilation of Fuel Oil pump houses.
- d) Lifting equipment (electric operated hoist) for unloading pump house for maintenance purpose of these pumps. Capacity of lifting equipment is envisaged as 2 T with lift as 7.5 m. Bidder to confirm adequacy of the same.
- e) DCS control. However, all logic for implementation of control and monitoring from DCS shall be provided by successful bidder during detail engineering.
- f) All power feeder and power supply cables for all motor drives.
- g) Fee for obtaining statutory approval from PESO and any other statutory authority.
- h) Exclusion as indicated in Electrical & C&I portion of technical specification
- i) Relevant exclusion as per GTR, GCC, SCC & ECC.

4.0.0 SERVICES TO BE PROVIDED BY THE CUSTOMER

- a) Relevant services as per GCC, SCC & ECC.

5.0.0 PERFORMANCE REQUIREMENTS AND PERFORMANCE GUARANTEES

This will comprise of:

- a) Inspection and testing of all valves as per approved QAP.
- b) Each storage tank shall be guaranteed for capacity and stability.
- c) Entire piping and supports for smooth operation.
- d) noise & vibration level of all operating pumps in parallel. The capacity of pumps while operating in parallel will be verified by indication in tank level difference.
- e) Noise level for safety valve to be limited to 105 dBa



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- f) All other machines / components / system shall be acoustically designed for a surface sound pressure level of $L_p < 85$ dB (A), measured in accordance with ISO 3746 respectively at a distance of 1.0 m from equipment surface and at a height of 1.5m above ground level. The surface sound pressure level (L_p) shall be averaged over the measurement surface and corrected for effect of background noise and the influence of reflected sound at measurement surface (environmental correction). With sound pressure levels of 85 dB (A) or less according ISO it shall be ensured that maximum surface noise levels of any item of plant of less than 85 dB (A) at 1.0 m from outline and a height of 1.5m from the floor shall be met during normal operating conditions.
- g) In case during test it is found that the equipment/system has failed to meet the guarantees, the contractor shall carry out all necessary modifications and/or replacements to make the equipment/system comply with the guaranteed requirements at no extra cost to the Employer. However, if the contractor is not able to demonstrate the guarantees, even after the above modifications/replacements within ninety (90) days or a reasonable period allowed by BHEL, after the tests have been completed, BHEL will have the right to Reject the equipment / system / plant and recover the payments already made or accept the equipment / system after assessing the deficiency in respect of the various ratings, performance parameters and capabilities and recover from the contract price an amount equivalent to the damages as determined by BHEL.
- h) The successful bidder will prepare a document titled "HANDLING OVER PROTOCOL" consisting various activities to be demonstrated by them for handing over of the package.**

6.0.0 LAYOUT REQUIREMENTS

- a) System layout shall conform to the requirements of the Petroleum Act 1934 & Petroleum Rules 2002, OISD 118 latest edition whichever is more stringent. The layout shall also conform to all other relevant OISD specifications
- b) All established engineering practices with regard to layout of various equipment & piping shall be followed and the same shall be subject to Customer approval during detail engineering without any commercial implication.
- c) Tentative Location of items related to Fuel Oil handling System is shown in enclosed drawings. This will be finalized during detail engineering based on equipment dimensions and other layout related requirements. There will however be no cost implication on account of the same.
- d) For road tanker unloading of LDO, LDO pumps will be located above ground. Further, while selecting pipe size, velocity inside the pipe shall not overshoot the velocity criteria indicated elsewhere in the specification.
- e) To the extent possible, all valves shall be located at grade level for easy operation & maintenance. Where location at grade level is not possible, suitable operating and maintenance platform made of MS grating and access ladder/ staircase/walkways to the same shall be given by the bidder. The platform and walkways will be designed by considering load of at least 750Kg/M².
- f) Where pipes are routed in a manner that it hampers man movement in that area, suitable no. of cross overs made of MS gratings shall be given across such pipes to facilitate easy man movement in such areas. Further suitable access ladder of MS construction shall be given for access to equipment/ pipes located in pit/ trench. Such structures shall be designed by considering a load of at least 750Kg/M².
- g) For all pedestal supported pipes, Customer scope will be limited to pedestal with insert plates. Maximum height of pedestal to be provided by CUSTOMER shall be 300 mm from FGL/FFL in the corresponding area. Structures required above these pedestals for supporting the pipes are included in the scope of the bidder. Pipe having BOP up to 2.0m



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from the grade level / FFL / FGL in the corresponding area shall be pedestal supported. However, inside the pump house no pedestals / insert plate shall be provided for fixing. Bidder shall support the pipes using pipe supports and anchor fasteners inside the pump house.

- h) Layout shall be prepared in a way to avoid the buried piping to the maximum possible extent.
- i) Oily water collected in storage tank area, oil unloading area will normally be collected in OWS pit by gravity either through trench (limited to a depth of 0.5 m) or through buried pipe (limited to a depth of 1.0 m) . However, in case depth of pipe between the pit and OWS pit exceeds 1 m or gravity flow is not possible due to layout constraints (which can be reviewed during detail engineering), the oily water waste shall be collected by pumping to OWS pit. Necessary pumps, valves, pipes, pipe supports, and instruments etc. for the same shall be included by bidder in their scope.
- j) Rainwater collected inside the dyke shall be diverted to storm water drain while contaminated oily waste shall be sent to OWS. All valves required in pits outside the dyke are included in bidder's scope of supply.
- k) Instruments to be mounted on tank shall be suitably located so as to have easy access from the staircase without interfering with man movement on the staircase. Wherever this is not possible, suitable platform along with access to the same shall be provided by FO System bidder.
- l) Signals from all field instruments shall be first terminated in Junction boxes before transmitting this signal either to Control panel or to I/O rack or to DCS. Junction box is included in bidder's scope. Erection of cable between field instruments to Junction Box is also included in bidder's scope. Scope of cable supply shall be as per project specific scope split sheet.
- m) All piping shall be arranged to provide clearance for removal of equipment requiring maintenance and easy access to valve and other piping accessories required for operation and maintenance. The layout drawing to be submitted by the successful bidder will necessarily show the valve orientation and access to valve and accessories.
- n) Instrument/ LIE/LIR shall not be located in space meant for walkway & maintenance space across the equipment , maintenance bay of building. Location of all instrument shall be marked in tipping layout drawing to ensure correct location of the same.

7.0.0 EQUIPMENT SELECTION & DESIGN CRITERIA

The minimum design criteria/ technical details to be followed for various equipment shall be as per Data Sheets / Design criteria under **Annexure-II including NTPC specification** and other details placed elsewhere in the specification. In case of any contradictory requirement for specification of particular equipment, and clarifications not having been sought by the bidders, the most stringent requirement as per interpretation of the BHEL will prevail. Successful bidder will furnish detailed data sheets/ specifications / design calculations for various equipment for customer's/ consultant's approval during detail engineering. For items for which specific technical specification is not enclosed, data sheet / dwgs / design calculations for such items shall be subject to customer/ consultant approval during detail engineering. All comments made by customer/ consultant shall be incorporated by the successful bidder without any commercial and delivery implication.

8.0.0 PAINTING / CORROSION PROTECTION REQUIREMENT

This will be as per **Annexure-V**. During detailed engineering stage, successful bidder shall prepare and submit the painting schedule for FOHS in line with customer specification for each equipment pipe, tanks, structure etc. for customer approval and changes suggested shall be taken care without any commercial implication.



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9.0.0 POWER PLANT PIPING & VALVES

Power plant piping and valve details are enclosed under **Annexure – II**

10.0.0 QUALITY ASSURANCE, QUALITY PLANS, INSPECTION & TESTING PROCEDURE:

- a) The successful bidder shall furnish Quality Plans/ Inspection Check Lists for various item for the package in line with minimum requirement indicated in specification during detail engineering for Customer's approval.
- b) For other items for which any specific inspection requirement is not indicated in the specification but the same included in scope of work , vendor specific QPs/ CLs shall be furnished by the successful bidder for Customer/Consultant's review and approval. All comments made by customer/ consultant shall be incorporated by the successful bidder without any commercial and delivery implication.
- c) The Field Quality Plan of bidder shall also be submitted by the successful bidder during detail engineering for customer's / consultant's approval. All comments made by customer/ consultant shall be incorporated by the successful bidder without any commercial and delivery implication.
- d) For flame proof actuator, motors, junction boxes, instruments etc. as per specification requirement, valid test certificate for the same shall be submitted by the vendor as part of QC documentation. In case valid test certificates are not available, necessary test shall be conducted in line with applicable standard in presence of customer and cost of such test shall be deemed to be included in the contract price

11.0.0 SUB-VENDOR ITEMS

The tentative make of Sub-vendor items shall be generally as per **Annexure-IV** enclosed which is subject to customer approval during detail engineering. Make of any unlisted items shall be subject to customer approval during detail engineering. For such items, bidder to furnish list of sub-vendors during detail engineering stage for customer's review and approval. Bidder shall furnish along with his offer the following supporting documentation within 1 month of placement of LOI. Thereafter no request for additional sub-vendor shall be entertained.

- a) Documentation to show that the equipment /system has been supplied for a plant of similar or higher capacity.
- b) Documentation in the form of certificate that the equipment/system has been operating satisfactorily for two years as on the scheduled date of bid opening.

The successful bidder will get the makes of all items approved from Customer/ Consultant during detail engineering within two months of placement of LOI. The complete list will be necessarily be submitted within one month of placement of LOI to ensure timely placement of order for BOIs

Bidder to assess the capability of their proposed sub-vendors in terms of preparation of drawings, calculations, documents, quality assurance, supply of material etc. as per project schedule before placing the order on them.



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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.

12.0.0 DRAWINGS AND DOCUMENTS TO BE SUBMITTED WITH THE BID

The drawings and documents to be submitted with the bid shall strictly be as per **Annexure-VI**. Any documents other than those indicated in **Annexure-VI** will not be reviewed and will not form part of contract.

13.0.0 DRAWINGS/ DOCUMENTS REQUIRED DURING DETAIL ENGINEERING

Tentative list of drawing / document required during detail engineering is attached in **Annexure – VII**. Any other drawings and documents as required by BHEL / Customer / Consultant shall be furnished by the successful bidder during detail engineering stage for which no commercial implication shall be entertained by BHEL.

14.0.0 DRAWINGS DISTRIBUTION SCHEDULE

Vendor needs to submit 10 sets of hard copies of each drawing/document during detail engineering along with editable soft copy of the same. However, exact no. of drawings / documents and submission/distribution procedure for the same shall be intimated to the successful bidder after award of contract and the same shall be complied by the successful bidder without any commercial implication.

15.0.0 DRAWINGS ENCLOSED WITH THE SPECIFICATION

Following drawings enclosed will form part of the specification.

- a) Plot plan
- b) Process & Instrumentation Diagram LDO UNLOADING AND STORAGE System.
- c) Sketch with Location of fuel oil facilities related to FOHS system (Stage-V).
- d) Piping Layout of Fuel Oil System (stage-III).

The P&ID is indicative and show the minimum requirement to be followed including minimum requirement of instruments. Any other item and instruments required (within the terminal points) to make the system complete in all respect and for satisfactory operation of the system shall also deemed to have been included by the bidder in their scope. The detailed P&I diagrams for LDO system in line with specification requirement shall be developed by the vendor during detail engineering for customer's approval and without any commercial implication to customer. Bidder to note that the while preparing PIDs after placement of order, successful bidder shall incorporate line numbers Instrument tag nos., KKS Numbering, equipment no, Line Spec, Line MOCs, legend / symbol chart , equipment capacity , relief valve capacity and set pressure, control valve capacity, range, fail position etc. in these drawing and same are subject to the customer approval.

16.0.0 Mandatory Spares

General Requirement of mandatory spares will be as per the list enclosed under annexure-II.



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17.0.0 OTHER REQUIREMENTS**i) Site Visit before submission of offer.**

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 wrt existing facility at site. Customer 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. .

ii) 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.

iii) The O&M Manual to be submitted by the successful bidder will necessarily address the following:

- a. Complete System Description along with PIDs, write up on electrical philosophy and safety/process interlocks etc.
- b. Instructions for plant operation
- c. Commissioning procedure of the system
- d. Chapter on precautions to be taken during:
 - Operation
 - Idle time
 - Long shutdown
- e. Chapter on trouble shooting during plant operation covering:
 - Safely aspects
 - Do's and do not's
 - Maintenance schedule
 - Schedule of lubricants & consumables
- f. O & M instruction for all individual equipment which shall invariably contain but not necessarily limited to the following:
 - Equipment description/interdiction
 - Data sheet, Equipment GA & Cross Section Drawing
 - Catalogue of each equipment
 - DO's & DON'T's
 - Duty Conditions
 - Installation & Safety Recommendation
 - Start-up & shut down procedure
 - Instructions for testing and adjustment of system parameters
 - Disassembly & Assembly Instructions giving sequence no. of each component
 - List of Replacement/ Spare parts along with their drawing and catalogues and procedure for ordering spares.
 - Reason & Remedy Chart for any problem
 - Maintenance Schedules- Daily, Weekly, Monthly, Half Yearly and Annual indicating clearly the spares part and man-hour requirement for each stage.
 - Detailed specification/ Schedule of all the consumables including lubricant oils, greases, chemicals etc. required for the complete system
 - Commission procedure for equipment.



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IV) 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.

V) In case vendor submits revised drawing/doc after approval of the corresponding drawing/doc, 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.

Vi) Bidder to note that the successful bidder, during detail engineering, will submit the drg/doc through web based Document Management System in addition to hard copies to be submitted as per dwg/ document distribution schedule. Bidder would be provided access to the DMS for drg/doc 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 (http://124.124.36.198/wrenchwebaccess/login.aspx)"

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>

Vii) 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 switch gear /MCC on account of changed loads.

Viii) Wherever CIVIL works is excluded from the bidder's scope, successful bidder shall furnish civil assignment 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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ANNEXURE-I

(SYSTEM WRITEUP)



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1.0 SYSTEM DESCRIPTION:

Light Diesel Oil (LDO) shall be used for initial startup & for flame stabilization during boiler start-up & subsequently during normal operation. The Fuel Oil Handling System envisaged comprises unloading & storage of LDO.

Fuel Oil Characteristics to be considered are placed at Annexure-I.

1.1 Light Diesel Oil System (LDO)

Light Diesel Oil (LDO) shall be delivered to power station site by 5 nos. road tankers. The LDO will be unloaded through flexible neoprene unloading hoses.

LDO from unloading header shall be pumped with the help of two (2) nos. (1W+1S) **existing unloading pumps of phase-III** each of capacity 50 m³/hr.

One (1) no. LDO storage tank having dimension as 14.0M dia x9.0 M ht (from tank bottom up to bottom of overflow nozzle) is envisaged. 20.0 Number of Anchor on Storage Tank foundation are firm and Bidder to ensure same

1.2 Drain Oil System, Sump water & Oil Water Separation

Fuel oil drain from the new LDO Storage tank shall be taken to the existing drain oil tanks as and when required. The drained oil in the drain oil tank will be pumped to the existing storage tank only. Pumping of drain oil to new LDO storage tank is not envisaged.

The Oil water from the new LDO storage tank dyke area will also be taken to existing Oil Water separator pit. Modification, if any, required in the civil structure of OWS is excluded from BHEL scope of work and the same shall be done by NTPC.

2.0 INSTRUMENTATION & CONTROL

DDCMIS based FOPH Control panel (EDN's scope) of Stage-V shall be located in the existing FOPH control room of Stage-III and shall be employed for control of pressuring pumps & associated system of stage-V under SG package. All the associated instruments and drives shall be suitably interfaced from the field/ switchgear to the FOPH Control System of Stage-V (located in Stage-III FOPH Control Room).

Signal of new LDO storage tank Level transmitter, inlet and outlet motorized valves of LDO storage tank shall be wired to max DNA based FOPH control panel of Stage-III.

For wiring signals of New LDO Storage Tank's Level Transmitter, inlet and outlet motorized valves status and for implementing their control in Stage-III FOPH Control System, necessary logic modification and any other augmentation (software /hardware) required in stage-III shall be done by BHEL.

Signal of unloading system viz. LDO tank level, status of motorized valves and unloading pumps shall be made available in FOPH control panel of stage-V through hard link between FOPH control panel of stage -III & stage-V for monitoring purpose only.



**TECHNICAL SPECIFICATION FOR
FUEL OIL HANDLING SYSTEM
1X500MW VINDHAYACHAL STPP, STAGE- V**

SPECIFICATION NO. PE-TS-389-166-A001

VOLUME II-B

SECTION 'C'-
ANNEXURE-1

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Selector switch (in soft) shall be used for stopping of existing unloading pumps while filling the new LDO tank or the existing LDO tank.

Necessary modification in HMI graphics of both Stage-III FOPH control panel and Stage- V shall be done to achieve the above requirement.


3.0 ELECTRICAL REQUIREMENTS:

Actuator on tank inlet and outlet valve shall have integral starter.

All power feeder and power supply cables for all motor drives shall be CUSTOMER/NTPC scope.

4.0 LIGHT DIESEL OIL (LDO) ANALYSIS AS PER IS 1460,2000


SL.	DESCRIPTION	UNIT	VALUE
1.1	Viscosity at 40° C	Cst	2.5 to 15.7
1.2	Density at 15° C Max.	kg/m3	850
1.3	Flash point, Min	°C	66
1.4	Pour point, Max. (Winter / Summer)	°C	12 / 21
1.5	Water content, Max.	% vol.	0.25
1.6	Sediment, Max.	% wt	0.10
1.7	Sulphur, Max.	% wt	1.8
1.8	Ash content, Max.	% wt	0.02
1.9	Gross calorific value (Approximate)	Kcal / kg	10,000


	TECHNICAL SPECIFICATION FOR FUEL OIL HANDLING SYSTEM 1X500MW VINDHAYACHAL STPP, STAGE- V	SPECIFICATION NO. PE-TS-389-166-A001	
		VOLUME II-B	SECTION 'C' - ANNEXURE-II
		REVISION 00	DATE:


ANNEXURE-II



CLAUSE NO.	SCOPE OF SUPPLY AND SERVICES																																	
	<p>PIPING, VALVES & PUMPS</p> <p>1.01.00 Piping</p> <p>1.01.01 Piping for 50 mm and larger size shall be butt-welded and small piping below 50 mm shall be socket welded.</p> <p>1.01.02 Piping shall be capable of withstanding the maximum pressure as follows:</p> <p>a) Fuel oil pipe line 10kg/cm² 90 deg.C</p> <p>c) Instrument air 5-7 kg/cm², 40 deg.C</p> <p>The minimum thickness of the pipe as detailed in this specification shall be adhered to.</p> <p>1.01.03 Expansion loops shall be provided for oil lines in order to restrict end forces and movements, and the necessary design calculations shall be furnished for Employer's approval.</p> <p>1.01.04 Outdoor support shall be provided with sliding movement of pipe over the support. All steel sliding support faces shall be covered with stainless steel plates with counter sunk screws on both top and bottom sliding faces of support.</p> <p>1.01.05 All guides anchors braces, dampers, expansion joint and structural steel to be attached to the building/structure trenches etc. shall be provided by Contractor.</p> <p>1.01.06 The oil piping material shall conform to API-5L Grade B ERW pipe or site fabricated from min. 8 mm thick steel plates to IS:2062 Gr.B / IS:3589 Gr. Fe410 for size 450NB and above. For sizes 400 NB and below the pipe material shall be conforming to API-5L Gr.B ERW. The pipe thickness (min.) for oil service shall be as under.</p> <table border="0" data-bbox="343 1276 1340 1926"> <tr><td>450 NB</td><td>:</td><td>7.14 mm (material as per API-5L Grade.B)</td></tr> <tr><td>400 NB</td><td>:</td><td>6.35 mm</td></tr> <tr><td>350/300 NB</td><td>:</td><td>6.35 mm</td></tr> <tr><td>250/200 NB</td><td>:</td><td>5.56 mm</td></tr> <tr><td>150 NB</td><td>:</td><td>4.78 mm</td></tr> <tr><td>100/80/65 NB</td><td>:</td><td>3.96 mm</td></tr> <tr><td>50 NB</td><td>:</td><td>3.91 mm</td></tr> <tr><td>40 NB</td><td>:</td><td>3.68 mm</td></tr> <tr><td>25 NB</td><td>:</td><td>3.38 mm</td></tr> <tr><td>20 NB</td><td>:</td><td>2.87 mm</td></tr> </table>			450 NB	:	7.14 mm (material as per API-5L Grade.B)	400 NB	:	6.35 mm	350/300 NB	:	6.35 mm	250/200 NB	:	5.56 mm	150 NB	:	4.78 mm	100/80/65 NB	:	3.96 mm	50 NB	:	3.91 mm	40 NB	:	3.68 mm	25 NB	:	3.38 mm	20 NB	:	2.87 mm	
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VSTPP-V (1X500 MW) STATION PIPING PACKAGE	TECHNICAL SPECIFICATION SECTION-VI PART-A	SUB-SECTION-IIA-01 B-FO-M2	PAGE 1 OF 4																															

CLAUSE NO.	SCOPE OF SUPPLY AND SERVICES			
1.01.07	<p>15 NB : 2.77 mm</p> <p>The minimum pipe size for various applications is indicated in the tender drawings. Wherever the pipe size is not indicated, the same shall be selected as per following criteria of velocity of the fluid in the pipeline.</p> <p>a) Suction side of the pump for oil & water application 0.6-1.2 m/sec.</p> <p>b) Discharge side of the pump for oil & water application 1.0-1.5 m/sec.</p>			
1.01.08	<p>Fittings for oil service shall be Butt welded fittings, conforming to ANSI B16.9 and material to ASTM-A-234. Fittings of 50mm size and below shall be socket welded conforming to ANSI B16.11, material to ASTM-A-105. Fitting of 50mm size and below shall be socket welded conforming to ANSI B-16.11, material to ASTM-A-105 (Forging).</p>			
1.01.09	<p>Vents at the highest point and drains at the lowest point shall be provided.</p>			
2.00.00	<p>VALVES</p>			
2.01.00	<p>All valves shall be suitable for most stringent service conditions i.e. flow, temperature and pressure under which they may be required to operate. The valves shall be full bore and sizes of valves shall be the same as that of the parent pipe.</p>			
2.02.00	<p>All manually operated valves shall be provided with gear operator of proven quality, reputed make and conforming to internationally accepted standard, if the effort required to operate the valve exceeds 25 kgf.</p>			
2.03.00	<p>All valves shall be provided with hand wheels, extension spindles and floor stands or any other arrangement wherever required so that they can be operated manually with ease by a single operator from the nearest operating floors either at a lower or higher elevation as the case may be. Wherever necessary for safety purpose, locking devices shall be furnished with valves.</p>			
2.04.00	<p>Gate Valves</p>			
2.04.01	<p>Gate valves shall be used for isolation purpose for sizes above 300 NB for oil lines. The gate valves shall be provided with hand wheel, position indicator and draining arrangement.</p>			
2.04.02	<p>Gate valves for sizes up to and including 40 NB shall be of class 800, forged carbon steel valves with solid wedge, OS & Y rising stem, bolted bonnet with deep stuffing box and lantern ring. Trim shall be of 13% chrome steel. Body material shall conform to ASTM A 105 and ends shall be socket welded.</p>			
2.04.03	<p>For sizes above 40 NB, valves shall be of class 150/300 (depending on service), Cast Carbon Steel gate valves. Face to face dimensions shall be as per ANSI B 16.10. Body material shall be ASTM A 216 Gr. WCB and ends shall be flanged to ANSI 150/300 lbs rating with raised face. Other particulars shall remain same as above.</p>			
2.04.04	<p>The valves shall conform to API-600/API-602 and shall be tested to API 598/IS: 6157 requirements. IBR certificates as necessary shall also be provided.</p>			
<p>VSTPP-V (1X500 MW) STATION PIPING PACKAGE</p>	<p>TECHNICAL SPECIFICATION SECTION-VI PART-A</p>	<p>SUB-SECTION-IIA-01 B-FO-M2</p>	<p>PAGE 2 OF 4</p>	

CLAUSE NO.	SCOPE OF SUPPLY AND SERVICES			
2.05.00	Globe Valves			
2.05.01	Globe valves shall be used for regulation purpose for all sizes in oil lines. They shall be provided with hand wheel, position indicator and draining arrangement.			
2.05.02	Globe valves for sizes up to and including 40 NB shall be of class 800 forged carbon steel valves with plug type disc. Other particulars shall be same as 2.04.02 above .			
2.05.03	For sizes above 40NB, valves shall be class 150/300 (depending on service) Cast Carbon steel globe valves with plug or ball type disc. Other particulars shall be same as 2.04.03 above .			
2.05.04	The valve shall conform to BS: 1873/BS: 5352 and shall be tested to BS:6755/ BS: 5146 requirements. IBR certificates as necessary shall also be provided.			
2.06.00	Check Valves			
2.06.01	Check valves shall be used for non return service for all sizes in oil lines.			
2.06.02	For sizes up to and including 50NB, check valves shall be of class 800 forged Carbon Steel horizontal lift type, with bolted cover. Valves shall have 13% Chrome Steel trim and body material to ASTM A 105. Ends shall be socket welded.			
2.06.03	For sizes above 50NB, check valves shall be of class 150/300 (depending on service) Cast Carbon Steel valves of swing check type having bolted cover. Trim shall be of 13% Chromium Steel and body material to ASTM A 216 Gr. WCB. Ends shall be flanged to ANSI Class 150/300 lb rating with raised face.			
2.06.04	The valve shall conform to BS: 1868/BS: 5352/ANSI B16.34 and shall be tested to BS: 5146 / BS:6755/API 598 requirements. IBR certificates as necessary shall also be provided.			
2.07.00	Oil Line Plug/Ball Valves			
2.07.01	Plug/Ball valves shall be used for isolation purpose in oil lines for sizes up to and including 300 NB. Valves shall be wrench or gear and hand wheel operated and shall have 'port' position indicators with CLOSE/OPEN indications marked on valve body.			
2.07.02	Ball valves for sizes up to and including 300 NB shall be of class 150 full bore type. Body material for plug/Ball valves shall be ASTM-A-216 GR. WCB. The ball shall be of SS-AISI-316 quality and plug material (for plug valves) shall be hardened steel to ASTM-A-216 Grade WCB with suitable heat treatment. Plug valves shall be self lubricated taper type of proven design.			
2.07.03	FO storage tank Inlet/fill line shall be provided with remote operated Ball valves. The details of valves shall be as per clause No.2.07.01 and 2.07.02. The actuator details shall be furnished by the bidder for Employer's approval.			
2.07.04	All ball valves shall conform to BS: 5351 and fire safe test shall conform to BS: 6755 part-2/ API 607. All plug valves shall conform to BS: 5353 and fire safe test shall meet the requirements of BS:6755 part-2. Fire safe certificates shall be submitted to Employer for approval. In absence of the certificates, the fire test shall be carried out by valve supplier.			
VSTPP-V (1X500 MW) STATION PIPING PACKAGE	TECHNICAL SPECIFICATION SECTION-VI PART-A	SUB-SECTION-IIA-01 B-FO-M2	PAGE 3 OF 4	


CLAUSE NO.	SCOPE OF SUPPLY AND SERVICES			
<p>3.00.00</p> <p>3.01.00</p> <p>3.03.00</p>	<p>HOSES</p> <p>The hoses for LDO shall conform to BS:1435 (latest edition), type S-7. The design temperature of the oil is 105 deg.C. The length of the hose shall be 8000 mm and dia 75 NB. Both the end connections shall be galvanized in accordance with BS:729/zinc sprayed as per BS:2569, Part-1.</p> <p>Strainers :</p> <p>The strainers at the suction of various pumps shall be simplex type basket strainers. The strainer shall be provided with plugged drain/blow off and vent connections. The free area of the strainer element shall be at least six (6) times the internal area of the connecting pipe lines. The strainer element shall be 40 mesh. Pressure drop across the strainers in new connection shall not exceed 1.5 MLC at full flow. The material of construction of various parts shall be as follows:</p> <p>(a) Body : MS to IS:2062 (min. 8mm thk) or Pipe to IS:3589 (min. 6.35 mm thk)</p> <p>(b) Strainer Element : Stainless Steel (AISI 316)</p> <p>(c) End connection : Flanged</p>			
<p>VSTPP-V (1X500 MW) STATION PIPING PACKAGE</p>	<p>TECHNICAL SPECIFICATION SECTION-VI PART-A</p>	<p>SUB-SECTION-IIA-01 B-FO-M2</p>	<p>PAGE 4 OF 4</p>	

Material of Construction

1.00.00

LDO STORAGE TANKS:

- | | | |
|------|--------------------------------|---|
| i) | Type of Construction | Vertical, Cylindrical, non-pressure, fixed roof type with atmospheric vents |
| ii) | Codes | Design and construction as per IS:803 |
| iii) | Design pressure | |
| | a) Internal Pressure | 66Kgf/m ² |
| | b) Vacuum | 63.5Kgf/m ² |
| iv) | Design Temperature | Ambient Temperature |
| v) | * Capacity cu.m | 1400 cu meter |
| vi) | * Dimensions (I.D x height) | 14 m dia x 9 m ht. (min.) |
| vii) | Material of construction | |
| | a) Tank Shell, roof and bottom | IS: 2062 Tested quality steel plates |
| | b) Structural | IS: 2062 Tested quality steel plates |
- * Note: Bidder has to offer the tanks as per the dimensions indicated at (vi) above. Height of the tank shall mean the vertical distance between tank bottom upto bottom of overflow nozzle.
- | | | |
|-------|---|---|
| viii) | Corrosion Allowance (minimum) | ----- 1.8 mm ----- |
| ix) | Shell Joint efficiency factor | ----- 0.85 ----- |
| x) | Vent | Tank shall be provided with open and free flow type atmospheric vent, which allows unimpeded flow of vapors out of and allows air into tank and at the same time prevents rain and air-borne dust from getting into the tank. |
| xi) | Nominal Venting capacity Shall be obtained by reference to API guide for tank venting (API-200) | |
| | c) Design Parameters: | |
| | - Construction code | IS: 2825, Class2/ ASME Section-VIII, Divn. I |
| | - Mechanical standard code | TEMA, Class C |

CLAUSE NO.	MANDATORY SPARES			
1.00.00	<p>GENERAL</p> <p>The Bidder shall include in his scope of supply all the necessary Mandatory spares, Start-up and commissioning spares and Recommended spares and indicate these in the relevant schedules of the Bid Forms & Price Schedules. The general requirements pertaining to the supply of these spares is given below:</p>			
1.01.00	<p>MANDATORY SPARES</p> <p>a) The list of mandatory spares considered essential by the Employer is indicated in the list enclosed to this Sub-Section. The bidder shall indicate the prices for each and every item (except for items not applicable to the bidders design) in the 'Schedule of Mandatory Spares' whether or not he considers it necessary for the Employer 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 in the Bid Forms & Price Schedules. Whenever the quantity is mentioned in "sets" the bidder has to give the item details and prices of each item.</p> <p>b) Whenever the quantity is indicated as a percentage, it shall mean percentage of total population of that item in the station (project), unless specified otherwise, and the fraction will be rounded off to the next higher whole number. Wherever the requirement has been specified as a 'set' (marked by **) it will include the total requirement of the item for a unit, module or the station as specified. Where it is specified as 'set' (marked by *) it would mean the requirement for the single equipment / system as the case may be. Also one set for the particular equipment. e.g. 'set' of bearings for a pump would include the total number of bearings in a pump. Also the 'set' would include all components required to replace the item; for example, a set of bearings shall include all hardware normally required while replacing the bearings.</p> <p>c) The assembly / sub assembly which have different orientation (like left hand, right hand, top or bottom), different direction of rotation or mirror image positioning or any other regions which result in maintaining two different sets of spares to be used for subject assembly / sub-assembly shall be considered as different type of assembly/sub-assembly.</p> <p>d) The Employer reserves the right to buy any or all the mandatory spare parts.</p> <p>e) The prices of mandatory spares indicated by the Bidder in the Bid Proposal sheets shall be used for bid evaluation purposes.</p> <p>f) 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.</p> <p>g) Wherever quantity is specified both as a percentage and a value, the Bidder has to supply the higher quantity until & unless specified otherwise.</p>			
1.02.00	<p>RECOMMENDED SPARES</p> <p>a) In addition to the spare parts mentioned above, the Contractor shall also provide a list of recommended spares for 3 years of normal operation of the plant and indicate the list and total prices in relevant schedule of the Bid Forms & Price</p>			
<p>VINHDYACHAL STPP-V (1X500MW) STEAM GENERATOR WITH ELECTROSTATIC PRECIPITATOR PACKAGE</p>	<p>TECHNICAL SPECIFICATION SECTION-VI BID DOC. NO.: CS-2260-101-2</p>	<p>PART-A SUB-SECTION-VII MANDATORY SPARES</p>	<p>PAGE 1 OF 35 - - -</p>	

CLAUSE NO.

MANDATORY SPARES



Schedules. This list shall take into consideration the mandatory spares specified in this Sub-Section and should be independent of the list of the mandatory spares. The Employer reserves the right to buy any or all of the recommended spares. The recommended spares shall be delivered at project site at least two months before the scheduled date of initial operation of first unit. However, the spares shall not be dispatched before the dispatch of the main equipment.

b) Prices of recommended spares will not be used for evaluation of the bids. The price of these spares will remain valid up to 6 months after placement of Notification of Award for the main equipment. However, the Contractor shall be liable to provide necessary justification for the quoted prices for these spares as desired by the Employer.

1.03.00

START-UP & COMMISSIONING SPARES

a) Start-up & commissioning spares are those spares which may be required during the start-up and commissioning of the equipment/system. All spares used till the Plant is handed over to the Employer shall come under this category. The Contractor shall provide for an adequate stock of such start up and commissioning spares to be brought by him to the site for the plant erection and commissioning. They must be available at site before the equipments are energized. The unused spares, if any, should be removed from there only after the issue of Taking Over certificate. All start up spares which remain unused at the time shall remain the property of the Contractor.

1.04.00

The Bidder shall include in his scope of supply all the necessary Mandatory spares, Start-up and commissioning spares and indicate these in the relevant schedules of the Bid Forms & Price Schedules. The general requirements pertaining to the supply of these spares is given below:

2.00.00

The Contractor shall indicate the service expectancy period for the spare parts (both mandatory and recommended) under normal operating conditions before replacement is necessary.

3.00.00

All spares supplied under this contract shall be strictly inter-changeable with the parts for which they are intended for replacements. The spares shall be treated and packed for long storage under the climatic conditions prevailing at the site e.g. small items shall be packed in sealed transparent plastic with desiccators packs as necessary.

4.00.00

All the spares (both recommended and mandatory) shall be manufactured along with the main equipment components as a continuous operation as per same specification and quality plan.

5.00.00

The Contractor will provide Employer with cross-sectional drawings, catalogues, assembly drawings and other relevant documents so as to enable the Employer to identify and finalize order for recommended spares.

6.00.00

Each spare part shall be clearly marked or labeled on the outside of the packing with its description. When more than one spare part is packed in a single case, a general description of the content shall be shown on the outside of such case and a detailed list enclosed. All cases, containers and other packages must be suitably marked and numbered for the purposes of identification.

VINHDIYACHAL STPP-V (1X500MW)
STEAM GENERATOR WITH ELECTROSTATIC
PRECIPITATOR PACKAGE

TECHNICAL SPECIFICATION
SECTION-VI
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PART-A
SUB-SECTION-VII
MANDATORY SPARES

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Marking



CLAUSE NO.

MANDATORY SPARES



7.00.00

All cases, containers or other packages are to be opened for such examination as may be considered necessary by the Employer.

8.00.00

The Contractor will provide the Employer with all the addresses and particulars of his sub-suppliers while placing the order on vendors for items/components/equipments covered under the Contract and will further ensure with his vendors that the Employer, if so desires, will have the right to place order for spares directly on them on mutually agreed terms based on offers of such vendors.

9.00.00

The Contractor shall warrant that all spares supplied will be new and in accordance with the Contract Documents and will be free from defects in design, material and workmanship.

10.00.00

In addition to the recommended spares listed by the Contractor, if the Employer further identifies certain particular items of spares, the Contractor shall submit the prices and delivery quotation for such spares within 30 days of receipt of such request with a validity period of 6 months for consideration by the Employer and placement of order for additional spares if the Employer so desires.

11.00.00

The Contractor shall guarantee the long term availability of spares to the Employer for the full life of the equipment covered under the Contract. The Contractor shall guarantee that before going out of production of spare parts of the equipment covered under the Contract, he shall give the Employer at least 2 years advance notice so that the latter may order his bulk requirement of spares, if he so desires. The same provision will also be applicable to Sub-contractors. Further, in case of discontinuance of manufacture of any spares by the Contractor and/or his Sub-Contractors, Contractor will provide the Employer, two years in advance, with full manufacturing drawings, material specifications and technical information including information on alternative equivalent makes required by the Employer for the purpose of manufacture/procurement of such items.



VINHDYACHAL STPP-V (1X500MW)
STEAM GENERATOR WITH ELECTROSTATIC
PRECIPITATOR PACKAGE

TECHNICAL SPECIFICATION
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PART-A
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MANDATORY SPARES

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MANDATORY SPARES FOR FUEL OIL UNLOADING & STORAGE SYSTEM

1x500MW VINDHAYACHAL STPP(STAGE-V)

SI. NO.	PARTICULARS	QUANTITY	Unit Ex-Works price (Rs.)	Total Ex-Works price (1 x 500 MW) (Rs.)	Remarks
6.00.00	MEASURING INSTRUMENTS(for all systems including Air Compressor, Dosing System, ECW System etc.)				
	1. Electronic Transmitters				
	1.1 Transmitters of all types, ranges (for the measurement of Pressure,differential pressure flow, level, etc.)	10% or 1 no. of each type and model			
	2. Temperature elements				
	2.1 RTD's* of each type and length(with head assembly, terminal block & nipple)	10% or 2 nos. of each type and length, whichever is more			
	2.2 Thermocouples of each type like K-type, R-type, metal etc. *	10% or 2 nos. of each type and length which ever is more			
	2.3 Thermowell for application like mill outlet temperature and SH/RH/Eco/ flue gas temp. in furnace	10% or 2 nos. of each type and length whichever is more.			
	2.4 Temperature transmitters	10% of each type and length			
	3. Local Indicators like temperature gauges, pressure gauges, differential pressure gauges, flow gauges, flow meters, Level etc.,	5% or 1 no. of each make, model and type whichever is more (to be divided to various ranges in proportion to main of all make, model, type population)			
	4. Process Actuated Switch Devices Includes all types of Pressure, differential pressure, flow, temperature, differential temperature, level switch Devices	5% or 1 no. of each type and model whichever is more			
	5. Electrical Metering Instruments Electrical meters including voltmeter, motor current ammeter.	5% or 1 no. of each type and model whichever is more.			
	6. PD Type Flow Transmitters(only in Trichy Scope)	5% or 1 no. of each type and model whichever is more.			
	7. Flue gas Analyzer instruments for oxygen (i) Electronic card Assemblies of each type (ii) Sets of gaskets/"O" rings (iii) Temperature Sensor & heater assembly (iv) Complete Probe with shield assembly (v) Consumables like filter elements etc	1 no. Each 10% 2 sets 20% 2 nos 100%			
8.00.00	Process Connection Piping (For impulse piping/ turbine sampling piping/turbine and air supply piping as applicable)				
	1. valves of all types and models	10% or 1 nos. of each type, class size and model whichever is applicable			
	2. 2 way, 3 way, 5 way valve manifolds	10% or 1 nos. of each type, class size and model whichever is applicable			
	3. fittings	10% or 1 nos. of each type, class size and model whichever is applicable			
	4. purge meters	10% or 1 nos. of each type, class size and model whichever is applicable			
11.00.00	ELECTRICAL ACTUATORS				
	1. Actuators	1 no. of each type, model and rating			
	2. Power unit for modulatiing actuator	1 no. of each type & size			
	3. DC-DC unit/power pack units	1 no. of each type & size			
	4. Electronic cards	1 no. of each type & size			
	5. Position Feed back transmitters	1 no. of each type & size			
	6. Control Unit	1 no.			
	7. Torque and Limit Switch Assembly	1 No.			

NOTE:-

1. The successful bidder immediately after approval of PID, Layout & equipment/ instrument data sheets /GA will prepare detailed list of mandatory spares with regard to their exact quantities, applicability/ non applicability; supply of alternate items against non-applicable items etc. This list will be submitted to customer for getting their approval. The successful bidder will proceed for ordering only after approval of the list.

2. Any item which is "not applicable" in the above list and is found to be "applicable" at a later date shall be supplied by the BIDDER without any extra cost.

3. Bidder to furnish unit rate for each and every item of list as applicable

TECHNICAL SPECIFICATION FOR**FUEL OIL HANDLING SYSTEM****1X500MW VINDHAYACHAL STPP, STAGE- V**

SPECIFICATION NO. PE-TS-389-166-A001

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SECTION 'C' -
ANNEXURE-III

REVISION 00


DATE:

ANNEXURE-III


Name of Contract Package: Fuel Oil system		QAP FOR MS PLATES & STRUCTURAL STEEL						Remarks									
Sl. No.	Component & Operation	Characteristics	Class	Type/Method of check	Quantum of check	Reference Documents	Acceptance Norms			Format of Record			Agency	M	V	C	
							Relevant code/IS 2062 Grade B/Grade A	MTC	P	R	R						
Raw Material																	
1	MS Plate & Structure	Chemical Composition	Major	Chemical Analysis	One sample/cast/batch/heat	Manufacturer's Test Certificate	Relevant code/IS 2062 Grade B/Grade A	MTC	P	R	R						
2	MS Plate & Structure	Mechanical	Major	Mechanical Properties	One sample/cast/batch/heat	Manufacturer's Test Certificate	Relevant code/IS 2062 Grade B/Grade A	MTC	P	R	R						
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>Digitally signed by RB YADAV DN: cn=RB YADAV, o=BHEL, ou=PEN, email=ram@bhel.co.in, c=IN</p> <p>Date: 2012.03.05 17:17:04 +05'30'</p> </div> <div style="width: 45%; text-align: right;"> <p>Approved By</p> </div> </div>																	
Sub Contractor		Signature															

Name of Contract Package:		QAP FOR PIPES & FITTINGS					Remarks					
Sl. No.	Inspection /Test Stage	Characteristics	Class	Type/Method of check	Quantum of check	Reference Documents	Acceptance Norms	Format of Record	Agency			
									P	W	V	
Inprocess & final Inspection												
1	Pipe	Chemical Composition	Major	Chemical Analysis	One sample/heat	Manufacturer's Test Certificate	As per ASTM A106/ANSI B36.10	MTC	3	2	1	
		Hydro test	Major	Leack test	100%	Manufacturer's Test Certificate	As per ASTM A106/ANSI B36.10	MTC	3	2	1	
		Surface dimensional end finish marking coating	Major	visual measurement	10%	Manufacturer's Test Certificate	As per ASTM A106/ANSI B36.10	MTC	3	2	1	
				visual measurement	10%							
				visual	1%							
				visual	1%							
2	Fitting	Surface dimensional end finish marking coating	Major	visual measurement	Random	Manufacturer's Test Certificate	As per ASTM A234 WPB or ANSI B16.9/B16.11	MTC	3	2	1	
<p>Legend:</p> <p>1: BECL/TCE</p> <p>2: BHEL/ TSPL</p> <p>3: Manufacturer</p> <p>MTC: Manufacturer's Test Certificate</p>												
Sub Contractor		Contractor		Signature		Reviewed By		Approved By				


Name of Contract Package: Fuel Oil system		QAP FOR PRESSURE INDICATOR						Remarks			
Sl. No.	Inspection /Test Stage/Components	Characteristics	Manufacturer : GENERAL INSTRUMENTS CONSORTIUM		Reference Documents	Acceptance Norms	Format of Record	Agency			
			Class	Type/Method of check				Quantum of check	P	W	V
1.0 RAW MATERIALS & BOUGHT OUT ITEMS											
1.1	CASING,BOURDON TUBE & MOVEMENT	Chemical composition		CHEMICAL TEST	1 sample from each lot	as per approved drawings	Test certificate	3	3	2,1	Test certificate/IR/ log book review only
		WORKMANSHIP ,FINISH & DIMENSIONS	MA	VISUAL MEASUREMENT	100%	as per approved drawings	IR/log book	3	3	2,1	
1.2	SWITCH	CONTACT TYPE & NUMBER	MA	VISUAL	100%	as per approved drawings	Test certificate/IR	3	3	2,1	
2.0 ASSEMBLY											
2.1	ASSEMBLY	Marking-tag No,model,range		VISUAL	100%	as per approved drawings	Inspection report	3	2	2,1	Inspection report review only
		Workmanship		VISUAL	100%	as per approved drawings		3	2	2,1	
		dial size,scale graduation	MA	VISUAL	100%	as per approved drawings		3	2	2,1	
		End connection		MEASUREMENT	100%	as per approved drawings		3	2	2,1	
		Switch contact type & Nos.		VISUAL	100%	as per approved drawings		3	2	2,1	
3.0 ROUTINE TEST											
3.1	ROUTINE TEST	CALIBRATION/A CCUARACY,HYS TRESIS,OVERLO AD,SET POINT,ADJUST MENT&REPEAT ABILITY	CR	measurement	100%	as per approved drawings	Inspection report	3	2	2,1	Inspection report review only
		Hydraulic Test	CR	MEASUREMENT	100%	as per approved drawings	Inspection report	3	2	2,1	Inspection report review only

4.0 Type test													
4.1	Type test	enclosure protection class	CR	varification	each Type	as per approved drawings	as per approved drawings	as per approved drawings	Test certificate	3	2	2,1	Test certificate review only
		blow out disc	CR	varification	each Type	as per approved drawings	as per approved drawings	as per approved drawings	Test certificate	3	2	2,1	Test certificate review only
		switch contact rating	CR	varification	each Type	as per approved drawings	as per approved drawings	as per approved drawings	Test certificate	3	2	2,1	Test certificate review only
5.0 Painting													
5.1	Painting	shade & finish	MA	VISUAL	100%	as per approved drawings	as per approved drawings	as per approved drawings	Inspection report	3	2	2,1	Inspection report review only
6.0 Packing													
6.1	Packing	Soundness of packing	MA	AS PER MANUFACTURING STANDARD	100%	PACKING LIST	AS PER MANUFACTURING STANDARD	AS PER MANUFACTURING STANDARD	PACKING LIST	3	2	2,1	PACKING LIST review
					1: BECL/TCE 2:BHEL/ TSPL 3:Manufacturer	Legend:							
	Sub Contractor	Contractor		MTC: Manufacturer's Test Certificate		Reviewed By		Approved By					
		Signature											

Name of Contract Package: Fuel Oil system		QAP FOR DIFFERENTIAL PRESSURE INDICATOR							Remarks			
Sl. No.	Inspection /Test Stage/Components	Characteristics	Class	Type/Method of check	Quantum of check	Reference Documents	Acceptance Norms	Format of Record	Agency			
									P	W	V	
1.0 RAW MATERIALS & BOUGHT OUT ITEMS												
1.1	CASING,BOURDON TUBE & MOVEMENT	Chemical composition	MA	CHEMICAL TEST	1 sample from each lot	as per approved drawings	as per approved drawings	Test certificate	3	3	2,1	Test certificate/IR/ log book review only
		WORKMANSHIP ,FINISH & DIMENSIONS		VISUAL MEASUREMENT	100%	as per approved drawings	as per approved IR/log book drawings	IR/log book	3	3	2,1	
1.2	SWITCH	CONTACT TYPE & NUMBER	MA	VISUAL	100%	as per approved drawings	as per approved drawings	Test certificate/IR	3	3	2,1	
2.0 ASSEMBLY												
2.1	ASSEMBLY	Marking-tag No,model,range	MA	VISUAL	100%	as per approved drawings	as per approved drawings	Inspection report	3	2	2,1	Inspection report review only
		Workmanship		VISUAL	100%	as per approved drawings	as per approved drawings		3	2	2,1	
		dial size,scale graduation		VISUAL	100%	as per approved drawings	as per approved drawings		3	2	2,1	
		End connection		MEASUREMENT	100%	as per approved drawings	as per approved drawings		3	2	2,1	
		Switch contact type & Nos.		VISUAL	100%	as per approved drawings	as per approved drawings		3	2	2,1	
3.0 ROUTINE TEST												
3.1	ROUTINE TEST	CALIBRATION/A CCUARACY,HYS TRESIS,OVERLO AD,SET POINT,ADJUST MENT&REPEAT ABILITY	CR	measurement	100%	as per approved drawings	as per approved drawings	Inspection report	3	2	2,1	Inspection report review only
		Hydraulic Test	CR	MEASUREMENT	100%	as per approved drawings	as per approved drawings	Inspection report	3	2	2,1	Inspection report review only

4.0 Type test													
4.1	Type test	enclosure protection class	CR	varification	each Type	as per approved drawings	as per approved drawings	as per approved drawings	Test certificate	3	2	2,1	Test certificate review only
		blow out disc	CR	varification	each Type	as per approved drawings	as per approved drawings	as per approved drawings	Test certificate	3	2	2,1	Test certificate review only
		switch contact rating	CR	varification	each Type	as per approved drawings	as per approved drawings	as per approved drawings	Test certificate	3	2	2,1	Test certificate review only
5.0 Painting													
5.1	Painting	shade & finish	MA	VISUAL	100%	as per approved drawings	as per approved drawings	as per approved drawings	Inspection report	3	2	2,1	Inspection report review only
6.0 Packing													
6.1	Packing	Soundness of packing	MA	AS PER MANUFACTURING STANDARD	100%	PACKING LIST	AS PER MANUFACTURING STANDARD	Legend: 1: BECL/TCE 2:BHEL/ TSPL 3.Manufacturer	PACKING LIST	3	2	2,1	PACKING LIST review
													
	Sub Contractor	Contractor	Signature						Reviewed By			Approved By	

Name of Contract Package: Fuel Oil system		QAP FOR TEMPERATURE INDICATOR												
Sl. No.	Inspection /Test Stage/Compo	Characteristics	Class	Type/Method of check	Quantum of check	Reference Documents	Acceptanc e Norms	Format of Record	Agency			Remarks		
									P	W	V			
1.0 RAW MATERIALS & BOUGHT OUT ITEMS														
1.1	Capillary bulb & thermowell	Chemical composition	CR	CHEMICAL TEST	1 sample from each lot	as per approved drawings	as per approved drawings	Test certificate	3	3	2,1	Test certificate /IR/ log book review only		
		marking	MA	VISUAL	100%	as per approved drawings	as per approved drawings	log book	3	3	2,1			
		Dimensions	MA	MEASUREMENT	100%	as per approved drawings	as per approved drawings	log book	3	3	2,1			
1.2	Casing & Bezel	material	MA	CHEMICAL TEST	sample	as per approved drawings	as per approved drawings	Test certificate/I R	3	3	2,1			
		defect		VISUAL	100%	as per approved drawings	as per approved drawings	log book	3	3	2,1			
		Dimensions		MEASUREMENT	sample	as per approved drawings	as per approved drawings	log book	3	3	2,1			
		Threading		thread Matching	100%	as per approved drawings	as per approved drawings	log book	3	3	2,1			
1.3	Dial	Size,range,scale length,least count,spacing & graduation	MA	MEASUREMENT & VISUAL	sample	as per approved drawings	as per approved drawings	log book	3	3	2,1			
		Colour		VISUAL	100%	as per approved drawings	as per approved drawings	log book	3	3	2,1			
		Resistance to dry heat & hot water		OVEN & BATH	sample	as per approved drawings	as per approved drawings	log book	3	3	2,1			
1.4	COMPLETE SENSING ELEMENT	Correct assembly & workmanship	MA	VISUAL	100%	as per approved drawings	as per approved drawings	log book	3	3	2,1			
		Dimensions		MEASUREMENT	100%	as per approved drawings	as per approved drawings	log book	3	3	2,1			
		Welding & other defects		VISUAL	100%	as per approved drawings	as per approved drawings	log book	3	3	2,1			
1.5	Thermowell	Dimensions ,thickness,concentricity of bore OD & length	MA	MEASUREMENT	100%	as per approved drawings	as per approved drawings	log book	3	3	2,1			
		Leak test	CR	hyd. Test at 1.5 times of design pressure	100%	as per approved drawings	as per approved drawings	inspection report	3	3	2,1			
		Threading	MA	thread Matching	100%	as per approved drawings	as per approved drawings	inspection report	3	3	2,1			
2.0 Final inspection														
2.1	ASSEMBLY	correct assembly,workmanship & finish	MA	VISUAL & Measurement	100%	as per approved drawings	as per approved drawings	Inspection report	3	2	2,1	Test certificate /IR/ log book		
		mounting & connection		VISUAL	100%	as per approved drawings	as per approved drawings	log book	3	2	2,1			
		dia scale		VISUAL	100%	as per approved drawings	as per approved drawings	log book	3	2	2,1			
		Cleanliness		VISUAL	100%	as per approved drawings	as per approved drawings	log book	3	2	2,1			
		Marking		VISUAL	100%	as per approved drawings	as per approved drawings	log book	3	2	2,1			
2.2	ROUTINE TEST	Accuracy												


			MA	measurement	100%	as per approved drawings	as per approved drawings	Test report	3	2	2,1	MANUFACTURER'S TEST CELL REVIEW ONLY
		Overload	CR	MEASUREMENT	10%	as per approved drawings	as per approved drawings	Test report	3	2	2,1	
		Response Time	MA	MEASUREMENT	10%	as per approved drawings	as per approved drawings	Test report	3	2	2,1	
2.3	Type test	ambient temp	MA	MEASUREMENT	sample	as per approved drawings	as per approved drawings	Test certificate	3	2	2,1	
		Weather proofness	CR	MEASUREMENT	sample	as per approved drawings	as per approved drawings	Test certificate	3	2	2,1	
3.0 Packing												
3.1	Packing	Soundness of packing	MA	AS PER MANUFACTURING STANDARD	100%	PACKING LIST	AS PER MANUFACTURING STANDARD	PACKING LIST	3	2	2,1	PACKING LIST review
					Legend:							
					1: BECL/TCE	P: Perform						
					2: BHEL/ TSPL	W: Witness						
			3. Manufacturer			V: Verification						
Sub Contractor			Contractor		MTC: Manufacturer's Test Cell			Reviewed By		Approved By		
Signature												

QAP FOR LEVEL INDICATOR


Name of Contract Package: Fuel Oil system												
SI. No.	Inspection /Test Stage/Component	Characteristics	Class	Type/Method of check	Quantum of check	Reference Documents	Acceptance Norms	Format of Record	Agency			Remarks
									P	W	V	
1	Flanges	Dimension & material specification	Major	Chemical Analysis	one sample per heat or lot	Specification /Approved Drawing	Specification /Approved Drawing	MTC/IR	3	-	1,2	-
2	Float	Dimension & material specification	Major	Chemical Analysis	one sample per heat or lot	Specification /Approved Drawing	Specification /Approved Drawing	TC/IR	3	-	1,2	-
3	Studs/Nuts	Dimension & material specification	Major	Visual Examination	100%	Specification /Approved Drawing	Specification /Approved Drawing	COC/IR	3	-	1,2	-
4	Assembly	Dimension & material specification	Major	Dimensional Check Visual	100%	Specification /Approved Drawing	Specification /Approved Drawing	IR/COC	3	-	1,2	-
5	Painting	Painting specification	Major			CSIPL standard	CSIPL standard	IR	3	-	1,2	-
6	Packing		Major	Road Worthy Packing	100%	CSIPL standard	CSIPL standard		3	-	1,2	-
				Legend:								
				1: BECL/TCE	P: Perform	COC: CERTIFICATE OF COMPLIANCE						
				2: BHEL/ TSPL	W: Witness	IR: INSPECTION REPORT						
				3: Manufacturer	V: Verification							
				MTC: Manufacturer's Test Certificate								
Sub Contractor Signature		Contractor								Approved By		



Sl. No.	Inspection /Test Stage/Component	Characteristics	Class	Type/Metho d of	Quantum of check	Reference Document	Acceptanc e Norms	Format of Record	Agency			Remarks
									P	W	V	
<div style="display: flex; justify-content: space-between; align-items: flex-start;"> <div style="text-align: center;">  <p>बी एच ई एल BHEL</p> </div> <div> <p>Name of Contract Package: Fuel Oil system</p> <p>Sub Contractor:</p> </div> <div style="text-align: center;"> <p>QAP FOR PRESSURE SWITCH</p> </div> </div>												
1.0 RAW MATERIALS												
1.1	Sensing Element,casing,contact, process connection	Chemical composition	MA	Chemical Analysis	1 sample from each lot	as per approved drawings	as per approved drawings	test report	3	2	2,1	TC/IR review only
		make,marking, Damage & Cracks	MA	Visual	100%	as per approved drawings	as per approved drawings	log book	3	2	2,1	
		Leakage	MA	Pressure Test	100%	as per approved drawings	no leak	log book	3	2	2,1	
	Micro Switch	No & type of contacts	MA	Visual	100%	as per approved drawings	no leak	log book	3	2	2,1	
		continuity	CR	electrical	100%	as per approved drawings	as per approved drawings	log book	3	2	2,1	
2.0 FINAL INSPECTION												
2.1	ASSEMBLY	MARKING,RANG,MODEL,TAG No,SI No.	MA	visual	100%	as per approved drawings	as per approved drawings	inspection report	3	2	2,1	TC/IR review only
		Correct assembly,Workmanship & finish	MA	visual	100%	as per approved drawings	as per approved drawings	log book	3	2	2,1	
		Connection	MA	visual & measurement	100%	as per approved drawings	as per approved drawings	inspection report	3	2	2,1	
		Scale marking	MA	visual	100%	as per approved drawings	as per approved drawings	inspection report	3	2	2,1	
		Cleanliness	MA	visual	100%	as per approved drawings	as per approved drawings	log book	3	2	2,1	
		Over all dimensions	MA	visual	100%	as per approved drawings	as per approved drawings	inspection report	3	2	2,1	
2.2	Routine Test	Over load	CR	measurement	100%	as per approved drawings	as per approved drawings	test report	3	2	2,1	TC/IR review only
		Repeatability	CR	measurement	100%	as per approved drawings	as per approved drawings	test report	3	2	2,1	
		Set Point adjustment	CR	measurement	100%	as per approved drawings	as per approved drawings	test report	3	2	2,1	

		Differential	CR	measurement	100%	as per approved drawings	as per approved drawings	test report	3	2	2,1	
		Contact rating	CR	measurement	100%	as per approved drawings	as per approved drawings	inspection report	3	2	2,1	
		insulation resistance & HV	CR	electrical	100%	as per approved drawings	as per approved drawings	test report	3	2	2,1	
2.3	Type Test	Weather proofness	CR	measurement	sample/design	as per approved drawings	as per approved drawings	test report	3	2	2,1	
3.0 Packing												
3.1	Packing	Soundness of packing	MA	visual	100%	as per approved drawings	as per approved drawings	log book	3	2	2,1	
			Legend:									
			1: BECL/TCE	P: Perform								
			2: BHEL/ TSPL	W: Witness								
			3: Manufacturer	V: Verification								
Sub Contractor		Contractor	MTC: Manufacturer's Test Certificate				Reviewed By		Approved By			
Signature												

Sl. No.	Inspection /Test Stage/Component	Characteristics	Class	Type/Metho d of	Quantum of check	Reference Document	Acceptanc e Norms	Format of Record	Agency			Remarks
									P	W	V	
 Name of Contract Package: QAP FOR DIFFERENTIAL PRESSURE SWITCH Fuel Oil system Sub Contractor:												
1.0 RAW MATERIALS												
1.1	Sensing Element,casing,contact, process connection	Chemical composition	MA	Chemical Analysis	1 sample from each lot	as per approved drawings	as per approved drawings	test report	3	2	2,1	TC/IR review only
		make,marking, Damage & Cracks	MA	Visual	100%	as per approved drawings	as per approved drawings	log book	3	2	2,1	
		Leakage	MA	Pressure Test	100%	as per approved drawings	no leak	log book	3	2	2,1	
	Micro Switch	No & type of contacts	MA	Visual	100%	as per approved drawings	no leak	log book	3	2	2,1	
		continuity	CR	electrical	100%	as per approved drawings	as per approved drawings	log book	3	2	2,1	
2.0 FINAL INSPECTION												
2.1	ASSEMBLY	MARKING,RANG,MODEL,TAG No,SI No.	MA	visual	100%	as per approved drawings	as per approved drawings	inspection report	3	2	2,1	TC/IR review only
		Correct assembly,Workmanship & finish	MA	visual	100%	as per approved drawings	as per approved drawings	log book	3	2	2,1	
		Connection	MA	visual & measurement	100%	as per approved drawings	as per approved drawings	inspection report	3	2	2,1	
		Scale marking	MA	visual	100%	as per approved drawings	as per approved drawings	inspection report	3	2	2,1	
		Cleanliness	MA	visual	100%	as per approved drawings	as per approved drawings	log book	3	2	2,1	
		Over all dimensions	MA	visual	100%	as per approved drawings	as per approved drawings	inspection report	3	2	2,1	
2.2	Routine Test	Over load	CR	measurement	100%	as per approved drawings	as per approved drawings	test report	3	2	2,1	TC/IR review only
		Repeatability	CR	measurement	100%	as per approved drawings	as per approved drawings	test report	3	2	2,1	
		Set Point adjustment	CR	measurement	100%	as per approved drawings	as per approved drawings	test report	3	2	2,1	

		Differential	CR	measurement	100%	as per approved drawings	as per approved drawings	test report	3	2	2,1	
		Contact rating	CR	measurement	100%	as per approved drawings	as per approved drawings	inspection report	3	2	2,1	
		insulation resistance & HV	CR	electrical	100%	as per approved drawings	as per approved drawings	test report	3	2	2,1	
2.3	Type Test	Weather proofness	CR	measurement	sample/design	as per approved drawings	as per approved drawings	test report	3	2	2,1	
3.0 Packing												
3.1	Packing	Soundness of packing	MA	visual	100%	as per approved drawings	as per approved drawings	log book	3	2	2,1	
				Legend:								
				1: BECL/TCE		P: Perform						
				2: BHEL/ TSPL		W: Witness						
				3: Manufacturer		V: Verification						
Sub Contractor		Contractor		MTC: Manufacturer's Test Certificate				Reviewed By		Approved By		
Signature												



Name of Contract Package: Fuel Oil system		QAP FOR LEVEL SWITCH										
Sub Contractor:												

Sl. No.	Inspection /Test Stage/Components	Characteristics	Class	Type/Method of check	Quantum of check	Reference Documents	Acceptance Norms	Format of Record	Agency			Remarks
									P	W	V	


1.0 RAW MATERIALS


1.1	Non wetted parts	Physical& Chemical Properties	MA	Physical& Chemical Analysis	1/cast	as per approved drawings	as per approved drawings	test report	3	2	2,1	TC/IR review only
1.2	Float assembly& wetted parts	Physical& Chemical Properties: float ,Chemical Properties: wetted parts	MA	Physical& Chemical Analysis	1/batch	as per approved drawings	as per approved drawings	inspection report	3	2	2,1	
1.3	Chamber	Dimensions & leak tightness	MA	measurement, visual, hyd test	100%	as per approved drawings	as per approved drawings	inspection report	3	2	2,1	
1.4	Float	Leak Tightness	MA	hyd. Test	100%	as per approved drawings	no leakage	inspection report	3	2	2,1	
1.5	Switch	make,type & rating	MA	visual	100%	as per approved drawings	as per approved drawings	inspection report	3	2	2,1	
		contact continuity	CR	electrical	100%	as per approved drawings	as per approved drawings	inspection report	3	2	2,1	

2.0 FINAL INSPECTION

2.1	ASSEMBLY	MARKING,RANG,MODEL, TAG No,SI No.	MA	visual	100%	as per approved drawings	as per approved drawings	inspection report	3	2	2,1	TC/IR review only
		Correct assembly,orkmans hip & finish	MA	visual	100%	as per approved drawings	as per approved drawings	log book	3	2	2,1	
		Connection	MA	visual & measurement	100%	as per approved drawings	as per approved drawings	inspection report	3	2	2,1	
		Scale marking	MA	visual	100%	as per approved drawings	as per approved drawings	inspection report	3	2	2,1	
		Cleanliness	MA	visual	100%	as per approved drawings	as per approved drawings	log book	3	2	2,1	
		Over all dimensions	MA	visual	100%	as per approved drawings	as per approved drawings	inspection report	3	2	2,1	
2.2	Routine Test	Over load	CR	measurement	100%	as per approved drawings	as per approved drawings	test report	3	2	2,1	
		Repeatability	CR	measurement	100%	as per approved drawings	as per approved drawings	test report	3	2	2,1	
		Set Point adjustment	CR	measurement	100%	as per approved drawings	as per approved drawings	test report	3	2	2,1	
		Differential	CR	measurement	100%	as per approved drawings	as per approved drawings	test report	3	2	2,1	
		Contact rating	CR	measurement	100%	as per approved drawings	as per approved drawings	inspection report	3	2	2,1	
		insulation resistance & HV	CR	electrical	100%	as per approved drawings	as per approved drawings	test report	3	2	2,1	
2.3	Type Test	Weather proofness	CR	measurement	sample/design	as per approved drawings	as per approved drawings	test report	3	2	2,1	
2.4	Packing	Soundness of packing	MA	visual	100%	as per approved drawings	as per approved drawings	log book	3	2	2,1	

		Legend:			
		1: BECL/TCE	P: Perform		
		2:BHEL/ TSPL	W: Witness		
		3.Manufacturer	V: Verification		
Sub Contractor	Contractor	MTC: Manufacturer's Test Certificate		Reviewed By	Approved By
Signature					

Name of Contract Package: Fuel Oil system		QAP FOR TEMPERATURE SWITCH						Remarks				
Sl. No.	Inspection /Test Stage/Components	Characteristics	Class	Type/Method of check	Quantum of check	Reference Documents	Acceptance Norms	Format of Record	Agency	Remarks		
									P W V			
1.0 RAW MATERIALS & BOUGHT OUT ITEMS												
1.1	Diaphragm	Chemical composition	MA	Material test	1 sample from each lot	as per approved drawings	as per approved drawings	Lab certificate	3	3	2,1	lab certificate review only
1.2	Chamber		MA						3	3	2,1	
2.0 INPROCESS INSPECTION												
2.1	Dimension	Measurement	MA	Dimension	10%	as per approved drawings	as per approved drawings	Q.C.Record	3	2	2,1	QC record review only
2.2	Process Conn		Thread	10%	as per approved drawings	as per approved drawings	Q.C.Record	3	2	2,1		
3.0 FINAL INSPECTION & TESTING												
3.1	Performance Check	scale accuracy	MA	measurement	100%	as per approved drawings	calibration certificate	Material test Certificate	3	2	2,1	Material test & calibration report review only
		Leak Test										
		Electrical continuity test										
		electric strength test										
		Switching differential test										
3.2	finished	Weather proof test	MA	Type test for ingress protection IP 65	10%	as per approved drawings	IS -13947 PART-1	Lab certificate	3	2	2,1	lab certificate review only
		Identification/T ag no		visual								
4.0 Packing												
4.1	Packing	Soundness of packing	MA	AS PER MANUFACTURING STANDARD	100%	PACKING LIST	AS PER MANUFACTURING STANDARD	PACKING LIST	3	3	2,1	PACKING LIST review
					Legend:							
					1: BECL/TCE							
					2: BHEL/TSP							
				3: Manufacturer								
				MTC: Manufacturer's Test Certificate								
Sub Contractor				Contractor								
				Signature								
				Reviewed By								
				Approved By								

Name of Contract Package: Fuel Oil system		QAP FOR TEMPERATURE SWITCH					Remarks					
SI. No.	Inspection /Test Stage/Components	Characteristics	Class	Type/Method of check	Quantum of check	Reference Documents	Acceptance Norms	Format of Record	P	W	V	
1.0 RAW MATERIALS & BOUGHT OUT ITEMS												
1.1	Bar	Chemical composition	MA	Material test	1 sample from each lot	as per approved drawings	as per approved drawings	Lab certificate	3	3	2,1	lab certificate review only
2.0 IMPROCESS INSPECTION												
2.1	Dimension	Measurement	MA	vernier	10%	as per approved drawings	as per approved drawings	Q.C.Record	3	2	2,1	QC record review only
2.2	Process Conn		Thread guage			10%	as per approved drawings	as per approved drawings	Q.C.Record	3	2	2,1
3.0 FINAL INSPECTION & TESTING												
3.1	Performance Check	hydro test	MA	Leakage visual	100%	as per approved drawings	as per approved drawings	compliance test certificate	3	2	2,1	compliance test certificate review only
3.2	finished composition	identification/Tag no			100%				3	2	2,1	
4.0 Packing												
4.1	Packing	Soundness of packing	MA	AS PER MANUFACTURING STANDARD	100%	PACKING LIST	AS PER MANUFACTURING STANDARD	PACKING LIST	3	3	2,1	PACKING LIST review
 <p>Legend: 1: BECL/TCE 2:BHEL/ TSPL 3.Manufacturer MTC: Manufacturer's Test Certificate</p>												
Sub Contractor									Reviewed By		Approved By	
Signature												

QAP FOR TEMPERATURE ELEMENT

MANUFACTURER :		MANUFACTURING QUALITY PLAN			Tpp		BHEL QAP NO. :					
		CUSTOMER : M/s BHEL, PEM, Noida .			TSPL QAP NO.		REVISION					
		PACKAGE : FOHS			DATE		5/3/2013					
		LOT NO. :			SHEET NO.		1 OF 2 W.O. 572					
SRL NO.	COMPONENTS / OPERATION	CHARACTERISTICS / ITEM	CLASS	TYPE /METHOD OF CHECK	QUANTUM OF CHECK	DOCUMENTS REFERRED	ACCEPTANCE NORM	FORMAT OF RECORD	INSP. AGENCY			
									P	W	V	RMK
1	RTD INSERT	ROUTINE TEST										
		A) DIMENSIONS + VISUAL TYPE	MA	MEASUREMENT	100%	APP'D DRGS	APP'D DRGS	TEST REPORT	3	-	2,1	
		B) CONTINUITY	MA	ELECTRICAL	100%	PROCEDURE INSTRUCTION	PROCEDURE INSTRUCTIONS	TEST REPORT	3	-	2,1	
		C) POLARITY	MT	ELECTRICAL	100%	PROCEDURE INSTRUCTION	PROCEDURE INSTRUCTIONS	TEST REPORT	3	-	2,1	
		D) IR TEST AT AMBIENT at 500Vdc	MA	ELECTRICAL	100%	PROCEDURE INSTRUCTIONS	PROCEDURE INSTRUCTIONS	TEST REPORT	3	-	2,1	
		E) LEAK TEST AT 7KG/CM2	MA	ELECTRICAL	100%	PROCEDURE INSTRUCTIONS	NO LEAKAGE	TEST REPORT	3	-	2,1	
		F) IDENTIFICATION CODE	CT	VISUAL	100%	IDENTIFICATION CODES	IEC 751	TEST REPORT	3	-	2,1	
2	RTD INSERTS	A) CALIBRATION AT 5 POINTS at 0Deg C, 100Deg C & 200Deg C.	MA	ELECTRICAL	100%	IEC 751, CLASS A	IEC 751, CLASS A	TEST REPORT	3	-	2,1	
3	HEAD	FLAMEPROOF	MA/CR	TESTING	EXPROOF	IS:2148, GR IIA,IIB	TEST CERTIFICATE & TEST REPORT	TEST REPORT	3	-	2,1	
CATEGORY : CR : CHAR AFFECTING SAFETY OF EQPT AND PERSONS MT : CHAR AFFECTING APPEARANCE MA : CHAR AFFECTING PERFORMANCE CT : CHAR AFFECTING TRACEABILITY AND IDENTIFICATION												
MANUFACTURER SUBCONTRACTOR						LEGEND :			BHEL DOC NO. PE-YO-356-166-A722			
SIGNATURE						1-BECL/TCE			Performing the test w- Agency			
						2-BHEL/TSPL						
						3-MANUFACTURER(MICON)						
As per Approved Sub Vendor List :						report			MTC - Material test cert. Mfgr- Manufacturer			
						COC - cert. of compliance						
SIGNATURE						Manufacturer			NAME & SIGNATURE OF APPROVING AUTHORITY			
						As per Approved Sub Vendor List :						



C/QA/016/QAP.PRTT12.3710/R2

MANUFACTURER :		MANUFACTURING QUALITY PLAN				Tpp		BHEL QAP NO. :					
ITEM : RTD ASSEMBLIES WITH THREADED THERMOWELLS		CUSTOMER : M/s BHEL, PEM, Noida .		TSPL QAP NO.		REVISION		DATE					
SRL NO.		CHARACTERISTICS / CHECKED		CAT		TYPE /METHOD OF CHECK		QUANTUM OF CHECK					
4	RAW MATERIAL FOR THERMOWELL ROD	METALLURGY	MA	CHEMICAL COMPOSITION	PER LOT	ASTM A 479 ASTM A 262	ACCEPTANCE NORM	ASTM A 479	INHOUSE /VENDOR TEST CERTIFICATE	3	-	2,1	
5	THERMOWELLS	A) DIMENSIONS+ VISUAL CHECK	MA	MEASUREMENT	100%	APP.DRGS/ P.O.SPECS	ACCEPTANCE NORM	APP.DRGS/ P.O.SPECS	TEST REPORT	3	-	2,1	
		B)THERMOWELL MATERIAL INTEGRITY	CR	HYDROTEST INTERNALLY	100%	PROCEDURE INSTRUCTION	ACCEPTANCE NORM	NO LEAKAGE	TEST REPORT	3	2	2,1	
CATEGORY : CR : CHAR AFFECTING SAFETY OF EQPT AND PERSONS MT : CHAR AFFECTING APPEARANCE MA : CHAR AFFECTING PERFORMANCE CT : CHAR AFFECTING TRACEABILITY AND IDENTIFICATION													
MANUFACTURER SUBCONTRACTOR		LEGEND :		1-BECL/TCE		Performing the test w- Agency		BHEL DOC NO. PE-V0-356-166-A722		REV 0			
SIGNATURE		COC - cert. of compliance Manufacturer		MTC - Material test cert. Mfgr- Manufacturer		As per Approved Sub Vendor List :		REVIEWED BY		NAME & SIGNATURE OF APPROVING AUTHORITY			

Note : 1) w - Witnessed by customer will be carried out on 10% of the order quantity & balance items review internal results

2) R-Review documents .

C/QA/016/QAP.PRT112.3710/R2

		Name of Contract Package: Fuel Oil system		QAP FOR LEVEL TRANSMITTER				Remarks		
Sl. No.	Inspection /Test Stage/Components	Characteristics	Class	Type/Method of check	Quantum of check	Reference Documents	Acceptance Norms	Format of Record	Agency	
									P W V	
Raw Materials										
1	Raw materials& components (Diaphragm,sensing material,housing,Electronic & other component)	Material properties,size, rating,make,type	Major	Internal test /Check	As per apr. draw& data sheet	Manuf.drawing/catalog	As per apr. draw& data sheet	Internal test report	3	
Inprocess Inspection										
2	Assembly& fitting	soudness of fitting,connections & terminal making	Major	Varification	100%	Manuf.drawing/catalog	As per apr. draw& data sheet	Internal test report	3	
Final Inspection										
3	Routine Test	a) General finish& visual verification b) Calibration Check c) Conection check d) Operation check	Major Critical Major Major	Visual Electrical Visual Electrical	10% 5% 5% 5%	Manuf.drawing/catalog Manuf.drawing/catalog Manuf.drawing/catalog Manuf.drawing/catalog	As per apr. draw& data sheet As per apr. draw& data sheet As per apr. draw& data sheet As per apr. draw& data sheet	TC TC TC TC	3 3 3 3	2,3 2,3 2,3 2,3
Packing & dispatch										
4	Packing & dispatch	soundness of packing against transit damage	Major	Varification	100%	PO specification	PO specification	Internal report	3	
										
Legend: 1: BECL/TCE 2:BHEL/ TSP 3.Manufacturer										
Sub Contractor Signature Contractor MTC: Manufacturer's Test Certificate										
Reviewed By Approved By										

QUALITY ASSURANCE PLAN

PROJECTS:- 2x250 MW BHAVNAGAR TPP

QAP NO:- 535
 REV NO: 01
 DATE: 06.06.2012.
 PAGE NO: 1 OF 4

CLIENT:-
 P.O.NO:- LOI-P-197-LOI-7
 BALL VALVE

MICON VALVES (I) PVT.LTD 7, WADEE
 MANZIL, 2ND FLOOR, OPP. MEMON CO.OP.
 BANK, 75-77E, LADY JAMSHEDJI RD, MAHIM,
 MUMBAI - 16

SL NO	COMPONENT & OPERATIONS	CHARATERISTICS	TYPE & METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTAN CE NORMS	FORMAT OF RECORD	AGENCY				
								P	W	V		
1	RAW MATERIAL											
1.1	Castings (Body, Side Pc & Ball	a. Verification	Material Tc	100%	Appr. Drg. Tech, Specs	Appr Drg & Tech, specs	Material TC	3	3/2	1,2		
		b. Size / Class	Material Tc	100%	Appr. Drg. Tech, Specs	Appr. Drg & Tech, specs	Material TC	3	3/2	1,2		
		c. Material ID	Material Tc	100%	Appr. Drg. Tech, Specs	Appr. Drg Tech, specs	Material TC	3	3/2	1,2		
		d. Heat No.	Material Tc	100%	Appr. Drg. Tech, Specs	Appr. Drg Tech, specs	Material TC	3	3/2	1,2		
		e. Surface Defect	Visual	100%	MSS-SP-55 ASTME B16.5 B16.10 B16.11	No crack acceptable ASTME B16.5 B16.10 B16.11	Inspection Report ASTME B16.5 B16.10 B16.11	3	3/2	1,2		
		f. Dimension	Vernier Scale	100%				3	3/2	1,2		
		g. Tensile Properties	Verification of foundry Tc	100%	Foundry TC for WCB	ASTM A216 GR WCB/A105		3	3/2	1,2		
		h. Chemical Properties	Verification of foundry Tc	100%	Foundry TC. for WCB	ASTM A216 GR WCB/A105		3	3/2	1,2		
		i. Heat Treatment	Verification of foundry Tc	100%	Foundry TC for WCB	ASTM A216 GR WCB/A105		3	3/2	1,2		
		1.2	SS Round Bar (Stem)	a. Dimension b. Chemical properties	Dimensional Check of main element	1 / lot/ size 1 / lot/size	SS 410 SS 304 SS 316	SS 410 SS 304 SS 316	-- LAB TC	3 3	3/2 3/2	1,2 1,2

Note:-1. BECL/TCE
 2. BHEL/TSP
 3. MANUFACTURER (MICON)



Customer's Inspector
 (Sign & Stamp)

QUALITY ASSURANCE PLAN

PROJECTS :- 2x250 MW BHAVNAGAR		TPP		QAP NO. 535		REV NO. 01		DATE 06.06.2012.		PAGE NO:- 2 OF 4	
MICON VALVES (I) PVT.LTD 7, WADEE MANZIL, 2ND FLOOR, OPP. MEMON CO.OP. BANK, 75-77E, LADY JAMSHEDJI RD, MAHIM, MUMBAI - 16		CLIENT :-		P.O.NO:- LOI-P-197-LOI-7		DATE:-22.05.2012		BALL VALVE		REMARKS	
SL NO	COMPONENT & OPERATIONS	CHARATERISTICS	TYPE & METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY			REMARKS
								P	W	V	
1.3	FASTENER	a. Dimension b. Tensile Properties c. Chemical Properties d. Heat Treatment	Dimensional Verification of Mfg. TC Verification of Mfg. TC Verification of Mfg. TC	1/lot/size 100% 100% 100%	Appr. Drg Appr. Drg Appr. Drg Appr. Drg	Appr. Drg Appr. Drg Appr. Drg Appr. Drg	MFG TC MFG TC MFG TC	3 3 3 3	3/2 3/2 3/2 3/2	1,2 1,2 1,2 1,2	
1.4	GASKET	a. Dimension b. Chemical	Dimensional Mfg. TC	1/lot/size 1/lot/size	As per DRG & PO	Mfg. Drg Relevant STD	MFG TC	3 3	3/2 3/2	1,2 1,2	
1.5	GLAND PACKING	a. Dimension	Dimensional	1/lot/size	As per DRG & PO	Mfg. Drg	MFG TC	3	3/2	1,2	
1.6	Lever	a. Dimension b. Surface Defect	Dimensional Visual	1/lot/size 1005	As per DRG & PO As per DRG & PO	Mfg. Drg Mfg. Drg	GRIR No crack acceptabl	3 3	3/2 3/2	1,2 1,2	

Note: 1. BECL/TCE
2. BHEL/TSPL
3. MANUFACTURER (MICON)

Customer's Inspector (Sign & Stamp)



QUALITY ASSURANCE PLAN

MICON VALVES (I) PVT.LTD 7, WADEE MANZIL, 2ND FLOOR, OPP. MEMON CO.OP. BANK, 75-77E, LADY JAMSHEDJI RD, MAHIM, MUMBAI - 16		CLIENT: -		PROJECTS:- 2x250 MW BHAVNAGAR TPP			
COMPONENT & OPERATIONS		P.O.NO:- LOI-P-197-LOI-7		GAP NO:- 535			
CHARACTERISTICS		DATE:- 22.05.2012		REV NO:- 01			
IN PROCESS INSPECTION		BALL VALVE		DATE :- 06.06.2012			
SL.NO.	TYPE & METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY	REMARKS
2.0						P W V	
2.1							
2.1							
2.2							
2.3							
2.1	Body/Side Pc & Ball	a. Machined Surface b. Dimension	Mfg. Drg Mfg Drg	No. Blow holes are acceptable Mfg. Drg. No Blow Holes are acceptable Mfg. Drg	In process report --	3 3/2 1,2 3 3/2 1,2	
2.1	Ball	Machine Surface	Mfg Drg	Holes are acceptable Mfg. Drg	In process report	3 3/2 1,2	
2.2	Components	b. Dimension	Mfg Drg	Mfg. Drg	In process report	3 3/2 1,2	
2.3	Assembly	Operational Test	APPR.DRG. P.O. APPR.DRG. P.O. APPR.DRG. P.O. APPR.DRG. P.O.	Mfg Std & Appr. drg. Mfg. Std & Appr. drg Mfg. Std. & Mfg. Std	In process report In process report In process report In process report	3 3/2 1,2 3 3/2 1,2 3 3/2 1,2 3 3/2 1,2	

Note: 1. BECL/TCE

2. BECL/TSPL



Customer's Inspector
(Sign & Stamp)

QUALITY ASSURANCE PLAN

CLIENT:		PROJECT:-2x250 MW BHAVNAGAR TPP										
P.O.NO:- LOI-P-197-LOI-7		DATE:- 22.05.2012										
MICON VALVES (I) PVT.LTD 7, WADEE MANZIL, 2ND FLOOR, OPP. MEMON CO OP. BANK, 75-77E, LADY JAMSHEDJI RD, MAHIM, MUMBAI - 16		BALL VALVE										
SL NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	TYPE & METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD			REMARKS		
							P	W	V			
3.0	FINAL INSPECTION (Before Painting)											
3.1	Ball Valve	a. Dimension	Flange Drilling Face to Face	100%	Relevant Std/App Drg	Relevant Std/App Drg	Dimensional report	3	3/2	1,2	Random by TPI	
		b. Operational Test	1. Full Opening / Closing Test	100%	App Drawing	Relevant Std/App Drg	Dimensional report	3	3/2	1,2		Random by TPI
		c. Pressure Testing	Hydro shell Hydro Seat Air Seat	100%	App Drawing App Drawing App Drawing	App Drawing App Drawing App Drawing	Testing Register Testing Register Testing Register	3 3 3	3/2 3/2 3/2	1,2 1,2 1,2		100% by Manufacturers & 10 % by Third Party Inspection Agency
Paint & Packing	a. Surface	Visual	Dryness		Painting certificate & MVI	Film thickness shall be more than 105 micron	Testing Register	3	3/2	1,2	For a C.S Casting 105 M minimum and for forgings painting not applicable.	
		Visual	Two coat of redoxide				Testing Register	3	3/2	1,2		
		Visual	One coat of hammer tone dark grey/Sea green				Testing Register	3	3/2	1,2		
		Visual	Anti rust layer at machined surface				Testing Register	3	3/2	1,2		
		Visual	Fixing of wooden/plastic and protector.				Dispatch Register	3	3/2	1,2		

Note: 1. BECL/TCE
2. BHEL/TSP

MICON VALVES MANUFACTURER (MICON)



Customer's Inspector (Sign & Stamp)

MANUFACTURING QUALITY ASSURANCE PLAN

MICON VALVES (I) PVT.LTD 7. WADEE MANZIL, 2ND FLOOR, OPP. MEMON CO.OP. BANK, 75-77E, LADY JAMSHEDJI RD, MAHIM, MUMBAI - 16		CLIENT: -		PROJECTS: - FOHS 2x250 MW BHAVNAGAR TPP					
P.O.NO		DATE:-03.07.2012.		QAP NO	562				
P.O.NO		DATE:-03.07.2012.		REV NO	01				
P.O.NO		DATE:-03.07.2012.		DATE	08/10/2012				
P.O.NO		DATE:-03.07.2012.		PAGE NO:-	2 OF 4				
Gate, Globe, Swing Check.									
SL NO	COMPONENT & OPERATIONS	CHARATERISTICS	TYPE & METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY	REMARKS
1.3	FASTENER	a. Dimension b. Tensile Properties c. Chemical Properties d. Heat Treatment	Dimensional Verification of Mfg. TC Verification of Mfg. TC Verification of Mfg. TC	1/lot/size 100% 100% 100%	Appr. Drg Appr. Drg Appr. Drg Appr. Drg	Appr. Drg Appr. Drg Appr. Drg Appr. Drg	MFG TC MFG TC MFG TC	P W V 3 3,2 1,2 3 3,2 1,2 3 3,2 1,2	
1.4	GASKET Spiral wound	a. Dimension b. Chemical	Dimensional Mfg. TC	1/lot/size 1/lot/size	As per Appr. Drg. P.O.	Mfg. Drg Relevant STD	MFG TC	3 3,2 1,2 3 3,2 1,2	
1.5	GLAND PACKING	a. Dimension	Dimensional	1/lot/size	As per Appr. Drg. P.O.	Mfg. Drg	MFG TC	3 3,2 1,2	
1.6	HAND WHEEL	a. Dimension b. Surface Defect	Dimensional Visual	1/lot/size 1005	As per Appr. Drg. P.O. As per Appr. Drg. P.O.	Mfg. Drg Mfg. Drg	GRIR No crack acceptabl	3 3,2 1,2 3 3,2 1,2	

1. BECL/TCE
2. BHEL/TSPL
3. MANUFACTURER (MICON VALVES)



Customer's Inspector
(Sign & Stamp)

MANUFACTURING QUALITY ASSURANCE PLAN

CLIENT: -		PROJECTS:- 2x250 for MW BHAVNAGAR TPP									
MICON VALVES (I) PVT.LTD 7, WADEE MANZIL, 2ND FLOOR, OPP. MEMON CO.OP. BANK, 75-77E, LADY JAMSHEDJI RD, MAHIM, MUMBAI - 16		GAP NO:- 562									
P.O.NO:-P-197-LOI-10		REV NO:- 01									
DATE:-03.07.2012		DATE :- 08/10/2012.									
Gate, Globe, Swing Check.		PAGE NO:- 3 OF 4									
SL.NO.	COMPONENT & OPERATIONS	CHARATERISTICS	TYPE & METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY			REMARKS
2.0	IN PROCESS INSPECTION							P	W	V	
2.1	Body/Cover & Disc/Wedge & Plug	a. Machined Surface	Visual	100%	Mfg. Drg.	No. Blow holes are acceptable Mfg. Drg.	In process report	3	3,2	1,2	
		b. Dimension	Dimensional	100%	Mfg Drg.		In process report	3	3,2	1,2	
2.1	Disc/Wedge	Machine Surface	Visual	100%	Mfg Drg.	No Blow Holes are acceptable	In process report	3	3,2	1,2	
2.2	Components	b. Dimension	Dimension	100%	Mfg Drg.	Mfg. Drg.	--do--	3	3,2	1,2	
2.3	Assembly	Operational Test	i. Full Opening /Closing Test ii. Back Seat Check iii. Min Stem Projection iv. Smooth Operation	100%	Appr. Drg. & P.O.	Mfg Std & Appr. Drg.	In process report	3	3,2	1,2	
				100%	Appr. Drg & P.O	Mfg. Std & Appr. Drg.	In process report	P	3,2	1,2	
				100%	Appr. Drg. & P.O.	Mfg. Std. & Appr. Drg.	In process report	P	3,2	1,2	
				100%	Appr. Drg. & P.O.	Mfg. Std & Appr. Drg.	In process report	P	3,2	1,2	

1. BECL/TCE
2. BHEL/TSPL
3. MANUFACTURER (MICON VALVES)



Customer's Inspector
(Sign & Stamp)