

		BHARAT HEAVY ELECTRICALS LIMITED [A Government of India Undertaking] Ramachandrapuram, Hyderabad, 502032, A.P. India Phone 040-23184526, 23182322 FAX:040-23021910, 1954			भारत हेवी इलेक्ट्रिकल्स लिमिटेड (भारत सरकार का उपक्रम) रामचन्द्रपुरम, हैदराबाद, 502032 आंध्र प्रदेश, भारत		RFQ NO :		PURCHASE DEPARTMENT ENQUIRY क्रय विभाग जांच (ई मेल : tenderbox@bhelhyd.co.in)		SHEET:1 OF :3	
HY17001 C REV.NO.0		Phone 091-40-23184526 091-40-23182322		FAX : 091-40-23021910 091-40-23021954		PURCHASE DEPARTMENT						
		GSTIN:		Enq/Collective No :E6A1T86687		Enq.Dt. : 04.01.2020		No.Of Items :*		DUE Dt. OF QUOTN. : 25.01.2020		
Office Copy				Please submit your lowest quotation in sealed cover superscribed with Enquiry No./Collective No.(RFQ No) and due date subject to our terms and conditions attached ,for the materials mentioned below.Your offer has to reach us onor before due date by 11.00 Hours (IST) and will be opened at 14.00 Hours.(IST).If our Enquiry No./Collective No.(RFQ No) and tender due date are not super scribed on the tender cover , your offer shall be summarily rejected. Incomplete offers and late offers will not be considered.								
SL NO	Purchase Req.no	item no	Material Code, HSN No.	Drg no - Ver , Rev & Spec - Ver , Rev,Spec-Var	Description	Unit	Qty	Delivery Date	Schedule Qty			
1	8000092093	10	TC9764515274	NA-,,TC64515,00,27	SGL STG STEAM TURBINE 2950RPM,45/55KW	EA	3.000	05.02.2020	1.000			
2	8000092091	10						05.02.2020	1.000			
3	8000092092	10						05.02.2020	1.000			
4	7000086707	10	TC9764515282	NA-,,TC64515,00,28	POWERED TACHOMETER FOR LOPDT 45/55KW	SET	3.000	19.03.2020	1.000			
5	7000086687	10						19.03.2020	1.000			
6	7000086702	10						19.03.2020	1.000			
7	7000086708	10	TC9764515290	NA-,,TC64515,00,29	SET OF GASKETS&ORINGS FOR LOPDT45/55KW	SET	3.000	19.03.2020	1.000			
8	7000086688	10						19.03.2020	1.000			
9	7000086703	10						19.03.2020	1.000			
10	7000086709	10	TC9764515304	NA-,,TC64515,00,30	STEAM INLET/EXHAUST PIPING-LOPDT45/55KW	SET	3.000	19.03.2020	1.000			
11	7000086689	10						19.03.2020	1.000			
						TEST CERTIFICATE REQD: Y GUARANTEE REQ : Y SAMPLE REQD : N BID TYPE : TWO PART		For and on-behalf of Bharat Heavy Electricals Limited. BHASKER REDDY K DY MANAGER				

		BHARAT HEAVY ELECTRICALS LIMITED [A Government of India Undertaking] Ramachandrapuram, Hyderabad, 502032, A.P. India Phone 040-23184526, 23182322 FAX:040-23021910, 1954			भारत हेवी इलेक्ट्रिकल्स लिमिटेड (भारत सरकार का उपक्रम) रामचन्द्रपुरम, हैदराबाद, 502032 आंध्र प्रदेश, भारत		RFQ NO :		PURCHASE DEPARTMENT ENQUIRY क्रय विभाग जांच (ई मेल : tenderbox@bhelhyd.co.in)		SHEET:2 OF :3	
HY17001 C REV.NO.0		Phone 091-40-23184526 091-40-23182322		FAX : 091-40-23021910 091-40-23021954		PURCHASE DEPARTMENT						
		GSTIN:		Eng/Collective No :E6A1T86687		Eng.Dt. : 04.01.2020		No.Of Items :*		DUE Dt. OF QUOTN. : 25.01.2020		
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SL NO	Purchase Req.no	item no	Material Code, HSN No.	Drg no - Ver , Rev & Spec - Ver , Rev,Spec-Var	Description	Unit	Qty	Delivery Date	Schedule Qty			
12	7000086704	10						19.03.2020	1.000			
13	7000086710	10	TC9764515312	NA-,,TC64515,00,31	LEAK OFF/DRAIN&STEAMTRAPASSY FOR LOPDT	SET	3.000	19.03.2020	1.000			
14	7000086700	10						19.03.2020	1.000			
15	7000086705	10						19.03.2020	1.000			
16	7000086711	10	TC9764515320	NA-,,TC64515,00,32	COOLING WATER INLET& OUTLET FOR LOPDT	SET	3.000	19.03.2020	1.000			
17	7000086701	10						19.03.2020	1.000			
18	7000086706	10						19.03.2020	1.000			
19	7000086712	10	TC9764515339	NA-,,TC64515,00,33	SET OF BEARINGS(DE&NDE)FOR LOPDT45/55KW	SET	1.000	19.03.2020	1.000			
20	7000086713	10	TC9764515347	NA-,,TC64515,00,34	SETOF OIL,STEAM,INTERSTAGE SEAL 45/55KW	SET	1.000	19.03.2020	1.000			
21	7000086714	10	TC9764515355	NA-,,TC64515,00,35	HYD. MECHANICAL GOVERNOR FOR LOPDT45/55	SET	1.000	19.03.2020	1.000			
						TEST CERTIFICATE REQD: Y GUARANTEE REQ : Y SAMPLE REQD : N BID TYPE : TWO PART			For and on-behalf of Bharat Heavy Electricals Limited. BHASKER REDDY K DY MANAGER			

		BHARAT HEAVY ELECTRICALS LIMITED [A Government of India Undertaking] Ramachandrapuram, Hyderabad, 502032, A.P. India Phone 040-23184526, 23182322 FAX:040-23021910, 1954			भारत हेवी इलेक्ट्रिकल्स लिमिटेड (भारत सरकार का उपक्रम) रामचन्द्रपुरम, हैदराबाद, 502032 आंध्र प्रदेश, भारत			RFQ NO :		PURCHASE DEPARTMENT ENQUIRY क्रय विभाग जांच (ई मेल : tenderbox@bhelhyd.co.in)		SHEET:3 OF :3	
HY17001 C REV.NO.0		Phone 091-40-23184526 091-40-23182322			FAX : 091-40-23021910 091-40-23021954			PURCHASE DEPARTMENT					
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SL NO	Purchase Req.no	item no	Material Code, HSN No.	Drg no - Ver , Rev & Spec - Ver , Rev,Spec-Var	Description			Unit	Qty	Delivery Date	Schedule Qty		
22	7000086715	10	TC9764515363	NA-,,TC64515,00,36	PRESS.GUAGE(10%OFEACHTYPE)FORLOPDT45/55			SET	2.000	19.03.2020	2.000		
23	7000086716	10	TC9764515371	NA-,,TC64515,00,37	RTD’S+THERMOWELL(10%OFEACHTYPE)45/55KW			SET	2.000	19.03.2020	2.000		
Special Remarks													
CheckList of Quality Interventions: BHEL reserves the right to enforce any or all of the following checks during execution of the order. There is no additional cost to the vendor on account of these checks.													
								TEST CERTIFICATE REQD: Y GUARANTEE REQ : Y SAMPLE REQD : N BID TYPE : TWO PART		For and on-behalf of Bharat Heavy Electricals Limited. BHASKER REDDY K DY MANAGER			

SUPPLIER QUESTIONNAIRE

Name of the proposed Equipment / Item / Process with Model / Type / Rating / Capacity / Size / Tonnage etc. (As applicable):

1. **Name of Proposed Sub-Supplier:** _____

Website: _____

2. **Address of Regd. Office:**

Details of contact person:

Name _____

Mobile no. _____

Desig. _____

E-mail: _____

• **Country of Head Office**

• **Field of activitie**

3. **Address of Works where
Item is being manufactured**

Details of contact person:

Name _____

Mobile no. _____

Desig. _____

E-mail: _____

4. **Branch / Liaison office Hyderabad** **Details of contact person:**

Name _____

Mobile no. _____

Desig. _____

E-mail: _____

SUPPLIER QUESTIONNAIRE

5. Details of Proposed Works:

- a. Year of Establishment of present works: _____
- b. Year of Commencement of: _____
Manufacturing at the above works
- c. Details of change in works address in past, if any : _____
- d. Total Covered Area : _____
- e. Details of covered area like no. of sheds, : _____
Area of each shed etc.
- f. Electric power- Connected load: _____
Electric power- Stand by load & system: _____

6. Annual Turnover & Profit in past three years : _____ : _____ :

7. Do you have in-house Department for

- a) Design Yes / No
- b) Research & Development Yes / No
- c) Quality control/Inspection Yes / No
- d) After Sales Service Yes / No

If any of these items answered with “No”, an explanation shall be provided.

8. Furnish Type Test report for the proposed product (if applicable).

9. Approval/Certification by National/International standards/accredited agency applicable for the proposed product (if applicable).

10. Furnish statutory/mandatory certification for proposed product (if applicable).

11. Furnish supply Experience list of the proposed product.

List shall include Item description (Type / Size / Rating / Model / Tonnage, as applicable), Customer name, Quantity, Year of Supply, and Year of commissioning.

12. Enclose End User's operational feedback certificate for the proposed product.

SUPPLIER QUESTIONNAIRE

13. Enclose list of equipment & machinery specific to the proposed product.

This should include name of equipment, capacity & nos. etc.:

14. Enclose Process Flow Diagram indicating in-house & outsourced process.

SUPPLIER QUESTIONNAIRE

15. Enclose Testing & Inspection facilities specific to the proposed product:

a. In-house _____

b. Outsourced _____

16. Storage of finished goods (covered / open). _____

17 Enclose list of the source / make with location of major raw material, bought out items and out sourced process _____

18. Furnish details regarding local service support and spare parts availability in site _____

SUPPLIER QUESTIONNAIRE

19. Quality management

19.1 General

19.1.1 Work Instruction for different processes available. (Y / N) _____
if yes, furnish list.

19.1.2 Evaluation system for raw material / bought out item's supplier is available.
(Y / N) _____

19.1.3 Records generated during inspection maintained & available for review?
(Y / N) _____

19.1.4 Statistical quality control techniques used? (Y/N) If yes please furnish details.
(Y / N) _____

19.1.5 ISO certificate for the works available? (Y / N) _____
If yes, enclose copy of the certificate.

19.1.6 Quality & HSE Manual for the works available (Y / N) _____
If yes, enclose copy of the manual.

19.2 Corrective action

19.2.1 Specifically confirm whether System for identifying & disposition of Non
Conformity in the process / product is available (Y / N) _____

19.2.2 Specifically confirm whether System for Customer complains & their satisfactory
disposal is available. (Y / N) _____

19.3. Documentation Control

19.3.1 Procedure available for documentation control (Y / N) _____

19.4. Control of Inspection, measuring & testing equipments.

19.4.1 Procedure for calibration of testing & measuring instrument available.
(Y / N) _____

SUPPLIER QUESTIONNAIRE

20. **Certification of sub-supplier**

I CERTIFY THAT THE INFORMATION SUPPLIED HEREIN (INCLUDING ALL PAGES ATTACHED) IS CORRECT.

SEAL

SIGNATURE _____

NAME _____

DESIGNATION _____

MOBILE NO _____

EMAIL _____

M/S. _____

PLACE _____

DATE _____

LIST OF ENCLOSURE:



**Annexure - I to purchase specification TC64515-R01
TURBINES AND COMPRESSORS
BHEL, HYDERABAD**

R00

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Projects: 3x12.5MW IOCL MATHURA REFINERY – LOS RETROFIT

1. **In case of any conflict between BHEL spec TC 64515 Rev 00 and other enquiry documents, the following preferential order shall govern.**

- 1) Customer Datasheet: **TPS-MM-DS-TECH-SPEC-MOPDT-R00**
- 2) TC 64515 Rev 01 & Terminal point sketch provided at clause 4.0 of this annexure.
- 3) Customer's Instruments specification TPS-MM-DS-TECH-SPEC-INSTRUMNT-R00 applicable for instruments/valve in scope of supply.
- 4) Customer's Pipe/Fittings specification TPS-MM-DS-TECH-SPEC-PIPE-FITTING-VALVE-R00, applicable for Piping/Fittings in scope of supply.
- 5) International standards/codes/recommended practices as applicable.

2. **The following are to be considered by vendor before offer:**

- 2.1 Compliance with this specification shall not relieve the vendor of the responsibility of furnishing equipment and auxiliaries of proper design, materials and workmanship to meet the specified operating conditions.
- 2.2 Noise level of the complete package shall be restricted within **85 dbA** at any point located **1 m** away from the equipment. If the noise level exceeds the specified value, necessary modifications to meet the noise level criteria, shall be provided by the vendor without any cost/time implications.
- 2.3 Turbine must be packed for an outdoor storage period of 6 months.
- 2.4 Painting scheme to be as per manufacturer standard.
- 2.5 The Turbine shall be suitable for the lube oil pump of normal BkW 33 to 35KW, Maximum BkW 45 kw and rated condition is 55KW. The turbine should be capable of delivering this power at the minimum inlet pressure and maximum exhaust pressure. Also the turbine shall be capable of delivering 10% extra power over the rated pump power with minimum steam inlet and maximum steam exhaust conditions.

- 2.6 The Turbine steam inlet and Exit parameters are as follows

SR no	Parameter	Min	Max	Normal
1	Steam inlet Pressure kg/Cm2	12	16	13.5
2	Steam inlet Temperature °C	275	325	300
3	Steam Exit pressure kg/Cm2	1 to 3.0 *	5	4.0
4	Steam Exit Temperature °C	200	250	225

- 2.7 The turbine should be of horizontally installed type with centreline casing supported design. The End Seal type shall be preferably carbon rings (**Vendor can offer brush seals if required for the given steam parameters**) and rotor shall be of between the bearing built up with forged shaft and disc design.
- 2.8 The turbine systems lubrication should be non-pressurized type (or ring oil lubrication) and separate from the main steam turbine lubrication system. All associated equipment's and piping for the lube oil system for the offered turbine will be in the scope of vendor.

Rev. No.	Revisions	Prepared:	Reviewed:	Approved	Date
00	Issue	SBJ	SBJ	P S V S K	06.12.2019

**Annexure I to purchase specification TC64515 R01****TURBINES AND COMPRESSORS****HYDERABAD**

R00

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COMP. FILE NAME

TC 5 4362-R00

Ref. Doc.

2.9 Hydraulic -mechanical type Constant speed governor is preferred.

2.10 There should be provision of Speed indication in DCS and hence powered tachometer is to be offered with turbine. Powered Tachometer shall transmit 4-20 mA o/p signal to control room which can be used for remote DCS speed indication with the help of convertor card in DCS (in customer scope) and for local speed indication near turbine.

2.11 Isolator shall be considered for bearing housing as oil seal.

2.12 Leak off and drain piping for turbine, sentinel warning valves, thermal insulation jacket or blanket insulation for turbine, steam traps with gate globe valves required in drain piping of turbine casing and steam chests, pneumatic solenoid trip mechanism for turbine remote trip from DCS/PLC, proximity switch for turbine trip indication to DCS/PLC, provision for radial vibration probes (2 no's per bearing), companion flanges for inlet and exhaust steam piping, steam inlet strainer etc. will have to be incorporated in the offered turbine.

2.13 Gauge board, Panels and instruments required for MOP turbine will be in scope of vendor. Local gauges if any, all accessories for governor, RTD's for bearing (2 nos. RTD's (duplex, 3 wired type) with provision for Transmitter, 1 each on Steam and exhaust end bearing housing), pressure gauge, associated tubing for these gauges required in the offered skid, junction boxes required for integrating these instrumentations will be in scope of vendor only.

2.14 Pipes, Fittings and valves shall be as per customer specification "TPS-MM-DS-TECH-SPEC-PIPE-FITTING-VALVE-R00"

2.15 Instruments shall be as per customer's specification "TPS-MM-DS-TECH-SPEC-INSTRUMNT-R00"

2.16 Make of speed probe and Tachometer, M/s Beacon is acceptable.

2.17 Instruments make shall be as per attached "Vendor List -C&I Items"

2.18 For Solenoid Valve & Tachometer, Safe zone as per electrical area of classification is applicable.

2.19 For instruments, area is to considered as safe area, so all instruments shall be certified for weather proof.

2.20 Solenoid valve rating shall be 220V DC and for electrical power supply for instruments like proximity switch, etc. is 24 VDC

2.21 Terminal point details for material codes TC9764515304, TC9764515312 & TC9764515320 shall be as per clause 4.0 of Annexure-I of TC64515-R01

3.0 Scope of supply:

a)	Lube oil pump Drive Turbine 2950RPM with Carbon Rings as seal (45/55 KW) with the steam parameters as per TC64515 specification.	TC9764515274	3 Nos
b)	TACHOMETER (powered) FOR LOPDT	TC9764515282	3 Sets
c)	Spare set of Gaskets (Casing Sealant - Copaltite) & "O" rings (Thread Sealant - Temptite) FOR LOPDT	TC9764515290	3 Sets
d)	Steam inlet and exhaust piping with Expander/Reducer & fittings to suit Inlet & Exhaust with companion flanges	TC9764515304	3 Sets
e)	Leak off/Drain piping & Steam Trap Assy for LOPDT	TC9764515312	3 Sets
f)	Cooling water inlet & outlet piping for LOPDT	TC9764515320	3 Sets



Annexure I to purchase specification TC64515 R01

TURBINES AND COMPRESSORS

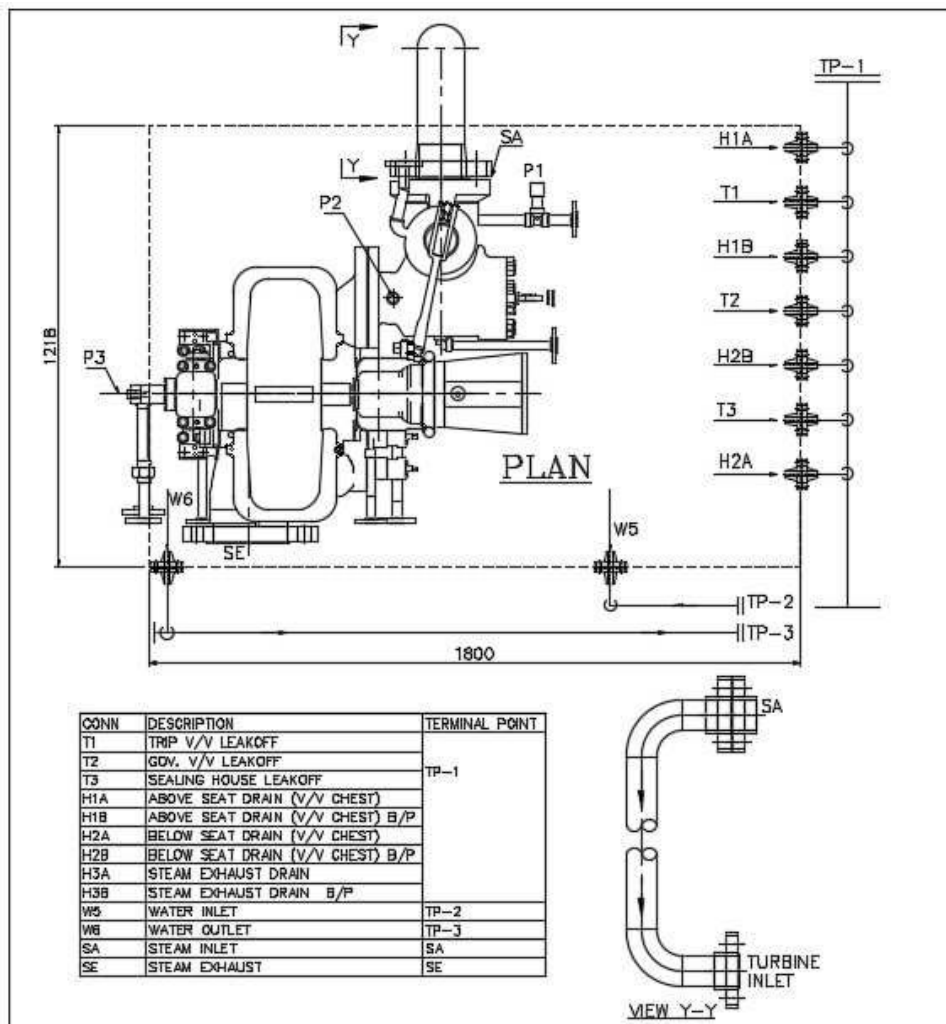
HYDERABAD

R00

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g)	Spare set of Bearings (DE & NDE; Radial & Thrust) for LOPDT	TC9764515339	1 Set
h)	Spare set of Oil seals (Isolator), steam seals (set of Carbon Rings) & Interstage Seals (if applicable) for LOPDT	TC9764515347	1 Set
i)	Spare set of Complete Hydro-mechanical Governor for LOPDT	TC9764515355	1 Set
j)	Spare set of PRESSURE GUAGE (10% OF EACH TYPE)	TC9764515363	2 Sets
k)	Spare set of RTD's with THERMOWELL (10% OF EACH TYPE) with provision for Transmitter	TC9764515371	2 Sets

4.0 Terminal Points detail



5.0 ENCLOSURES:

- 1) Customer Datasheet: TPS-MM-DS-TECH-SPEC-MOPDT-R00
- 2) TC 64515 Rev 01
- 3) Annexures of TC 64515-R01
- 4) TC 64515 Rev 01 & Terminal point sketch provided at clause 4.0 of this annexure
- 5) Customer's Instruments specification TPS-MM-DS-TECH-SPEC-INSTRUMNT-R00 applicable for instruments/valve in scope of supply.
- 6) Customer's Pipe/Fittings specification TPS-MM-DS-TECH-SPEC-PIPE-FITTING-VALVE-R00, applicable for Piping/Fittings in scope of supply.
- 7) Vendor List -C&I Items

ANEXURE II to Purchase Specification TC64515-R01

Projects: 3x12.5MW IOCL MATHURA REFINERY – LOS RETROFIT

BHEL Enquiry Ref No _____ Date _____

Vendor offer Ref No _____ Date _____

The vendor shall complete the experience record pro-forma as per below to prove that the equipment offered meets the EQC for technical acceptance..

Vendor may furnish additional information to justify that the EQC is being met. In addition, manufacturer's catalogue and general reference list for all the below equipment's shall also be furnished along with the proposal.

PROVEN TRACK RECORD FOR THE MODEL BEING OFFERED (FOR MORE THAN 8000 HOURS/Complete one year)

SL.NO	PLANT NAME /LOCATION	CLIENT	MODEL/INLET/OUTLET STEAM PARAMETERS/KW/SPEED/MATERIAL	YEAR OF COMMISSIONING	NO. OF RUNNING HOURS LOGGED

Signature and stamp of vendor

Projects: 3x12.5MW IOCL MATHURA REFINERY – LOS RETROFIT

Technical Deviation Sheet (TDS Sheet):

Deviations to TC64515-R01

Annex-I to purchase spec TC64515 R00,
Customer data sheet TPS-MM-DS-TECH-SPEC-MOPDT-R00

Sl. No	Spec No	Description of Spec	Deviation	Reason

Vendor's Signature

Vendor's Company seal



**Annexure-IV to purchase specification TC64515-R01
TURBINES AND COMPRESSORS
BHEL, HYDERABAD**

R00

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**Projects: 3x12.5MW IOCL MATHURA REFINERY – LOS RETROFIT
PRICE SCHEDULE**

Enquiry ref. No:
Offer ref no.

Date:
Date:

Sl. No	Description	Mat. code	Qty	Price/qty	Total Price
1.0					
a)	Lube oil pump Drive Turbine 2950RPM with Carbon Rings as seal (45/55 KW) with the steam parameters as per TC64515 specification & clause 3.0.0 of TC64515 .	TC9764515274	3 Nos		
b)	TACHOMETER (powered) FOR LOPDT	TC9764515282	3 Sets		
c)	Spare set of Gaskets (Casing Sealant - Copaltite) & "O" rings (Thread Sealant - Temptite) FOR LOPDT	TC9764515290	3 Sets		
d)	Steam inlet and exhaust piping with Expander/Reducer & fittings to suit Inlet & Exhaust with companion flanges	TC9764515304	3 Sets		
e)	Leak off/Drain piping & Steam Trap Assy for LOPDT	TC9764515312	3 Sets		
f)	Cooling water inlet & outlet piping for LOPDT	TC9764515320	3 Sets		
g)	Spare set of Bearings (DE & NDE; Radial & Thrust) for LOPDT	TC9764515339	1 Set		
h)	Spare set of Oil seals (Isolator), steam seals (set of Carbon Rings) & Interstage Seals (if applicable) for LOPDT	TC9764515347	1 Set		
i)	Spare set of Complete Hydro-mechanical Governor for LOPDT	TC9764515355	1 Set		
j)	Spare set of PRESSURE GUAGE (10% OF EACH TYPE)	TC9764515363	2 Sets		
k)	Spare set of RTD's with THERMOWELL (10% OF EACH TYPE) with provision for Transmitter	TC9764515371	2 Sets		
2.0	Vendor to submit offer for 2-year normal operational spares for lube oil pump drive turbine & its control equipment along with offer. The prices shall be quoted individually in the price format. Un priced bid format shall be sent along with offer. The validity of spare price shall be one year after placement of main equipment order.		1 set		
3.0	Requirement of Services from vendor during functional testing of Lube oil pump at BHEL works & SITE Commissioning activity at IOCL Mathura refinery site				
3.1	# Two day stay at IOCL Mathura refinery site including to and fro charges & accommodation (If Required)	-----	Per visit		
3.2	# Charges for additional stay per day at IOCL Mathura refinery site other than above (If Required)	-----	Per day		

Notes:

- Prices of Sl. No 01 and 03 of above shall be considered for lowest vendor (L1) price evaluation.
- Sl. No. 02 above are valid for one year after placement of order. The spare split prices are to be provided by vendor along with offer. These items will be ordered when the requirement arises.
- Any additional requirements, which are essential for proper functioning of, LOP but not indicated in Specification are included in the main offer.
- Service charges of Sl. No. 03 shall be valid up to one year post warranty period. Service order will be placed if requirement arises.

Vendor's Signature**Vendor's Company seal**

Rev. No.	Revisions	Prepared:	Reviewed:	Approved	Date
00	Issue	S B J	S B J	P S V S K	06.12.2019



Annexure-V to purchase specification TC64515 Rev 01
TURBINES AND COMPRESSORS
BHEL, HYDERABAD

R00

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Projects: 3x12.5MW IOCL MATHURA REFINERY – LOS RETROFIT

Table 1: Check List

(TO BE FILLED BY THE VENDOR AND SUBMITTED ALONG WITH THE OFFER WITH OUT WHICH OFFER WILL NOT BE CONSIDERED)

S. No.	Description	Vendor's Confirmation (Yes/No)
1	Compliance for BHEL specification TC64515 Rev 01	
2	Compliance to Customer data sheet TPS-MM-DS-TECH-SPEC-MOPDT-R00	
3	Customer's Instruments specification TPS-MM-DS-TECH-SPEC-INSTRUMNT-R00	
4	Customer's Instruments specification TPS-MM-DS-TECH-SPEC-PIPE-FITTING-VALVE-R00	
5	Customer's Vendor List -C&I Items	
6	Compliance to Annex-I to purchase spec TC64515 R01	
7	The Scope of supply is detailed in Annex-I to purchase spec TC64515 R01, Same to referred and if in doubt shall be discussed during Pre-Bid clarifications.	
8	Price Schedule as per Annexure IV & signed filled copy of Price schedule (without prices) enclosed with technical offer.	
9	Deviations if any to submitted offer mentioned in Annex-III Technical Deviation Sheet.	
10	Filled up equipment data sheets TPS-MM-DS-TECH-SPEC-MOPDT-R00	
11	Proven Track Record as per Annexure II of purchase spec TC 64515 Rev01.	
12	Painting shall be as per manufacturer standard.	
13	Recommended commissioning spares for Turbine during commissioning operation as per clause 3.2.0 of specification TC64515. These are to be clearly specified in the offer & these prices are to be included in the equipment price by BHEL.	
14	Recommended spares for two years of normal operation for Turbine & control equipment: The list for all the items with item wise prices to be specified. The offer shall be valid for one year after placement of order and these shall be ordered as required later. These prices are not to be included in the equipment price by BHEL.	
15	Any additional requirements which are essential for proper functioning of the equipment included in the offer.	
16	Vendor shall confirm that the bill of material furnished along with offer is only indicative and the final BOM, which shall be furnished during detailed Engineering (after order placement) for the approval of BHEL. The additional items, if any required at later stage for complying BHEL specification or for the satisfactory working of the equipment shall be supplied by vendor without any price/delivery implications.	

Vendor's Signature

Vendor's Company seal

Rev. No.	Revisions	Prepared:	Reviewed:	Approved	Date
00	Issue	S B J	S B J	P.S.V.S.K	06.12.2019

PRE-QUALIFICATION CRITERIA				
SINGLE STAGE STEAM TURBINE				
S.No.	BHEL Requirement		Vendor's Confirmation	Deviation if Any
1	All the suppliers need to submit this document i.e. titled pre-qualification criteria and furnish required information along with offer.			
2	a)	Name, address, e-mail id, contact no.etc. of manufacturer of Single stage steam turbine		
	b)	Name, address, e-mail id, contact no.etc. of authourised agency / trading house quoting on behalf of manufacturer In case offer is received from authourised agency / trading house, the following requirements shall be full filled. i) Valid letter of authorisation and copy of agreement to be enclosed with offer. ii) The offer shall be either from the authorised agency or from the manufacturer directly. In case of BHEL receiving offer from both, then offer from manufaturer will only be considered. Offer from an unauthorised agency / entity on behalf of any vendor shall be summarily rejected. iii) Name, address, e-mail id, contact no.etc. of entity on whom order to be released in case of L1 shall be clearly indicated.		
3	Supplier to confirm/provide the following criteria/documents for evaluation of offer.			
	(a)	The supplier should have the proven experience in manufacturing and supply of Single stage turbine.		
	i	Application: Lube oil system		
	ii	Service:Steam turbine as a driver for Lube oil Pump		
	iii)	Satisfactory Working of equipment: At least two year in a power plant ending lastday of month previous to the one in which enquiry floated.		
	iv	All the facilities required for manufacturing of single stage turbine shall be available with manufacturer. All the facillites of assembling and testing (at closest to enquiry parameters) of turbine shall be available with manufacturer as per API 611 (General Purpose).		
	v	Vendor shall furnish the details of Sale after Service facilities available in India with referneces of executed project. Spare shall be readily available at propretary suppliers/ distributors in India.		
	All the above criteria 3(a) (i) to 3(a) (v) must be combinedly met by the vendor against a single supply reference of steam turbine.			
	(b) The supplier meeting all the above criteria as 3 (a) (i) to 3 (a) (v) shall furnish details of such supplies only as indicated above (sl no 3 (a)) including equipment Manufacturer's Name, power plant name, date of supply (in DDMMYY format), No of years the equipment is in service) Manufacturer & power plant. (including mobile no and e-Mail ID) Note : Suppliers shall furnish minimum 02 and maximum 06 number of latest customer reference details as indicated above in the attached annexure-I. Details furnished in any other format shall not be considered. All the documents shall be furnished only in English. Documents furnished in other langauges will not be considered for further evaluation.			
	(c) BHEL reserves the right to cross verify with the above such customers including overseas customers with a copy to the supplier and satisfy itself with reference to the claims of the supplier. If the information furnished by the supplier is not found satisfactory, the offer will be technically rejected.			
4	Offers without the requirement as above 3(a) & 3(b) will not be technically evaluated by BHEL. Further, no correspondence in this matter will be entertained.			
5	The vendors should furnish the detailed process of manufacturing and testing procedures along with the offer.			
6	List of BHEL qualified bidders shall be forwarded to BHEL's End Customer for their review and approval. The list finalized by BHEL's End Customer shall be final and binding.			
7	BHEL team may carry out vendor evaluation/assesment(incase of a new vendor) by a visit to vendor works for qualifying /rejecting the technical bid based on the findings of the visit.			
8	Vendors to submit their bid in 2 - part system i.e. A) Part-I shall consists of PQC: Pre-Qualification Criteria along with the required documents like 1)Annex-I (PQC) sub supplier questionire, 2) Annex-II (PQC) PTR to purchase spec TC64515 R01, 3) Annex-III (PQC) Technical Deviation Sheet to TC64515 Rev01. B) Part-II shall consists of Techno-Commercial Bid: Vendor shall submit duly filled Annex-I, II, III, IV & V to TC64515, technical offer as per TC64515 along with Price Bid. Offers failing to meet prequalification criteria Part-I will not be considered for further evaluation.			



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INDUSTRIAL TURBINES AND COMPRESSORS

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SINGLE STAGE HORIZONTAL STEAM TURBINE FOR LUBE OIL PUMP

1.0.0

SCOPE:

This standard specifies the requirements of single stage horizontal steam turbine used for driving Centrifugal / Screw pumps of lube oil systems of Industrial Turbo sets and Compressor drives.

2.0.0

TECHNICAL REQUIREMENTS :

2.1.0

General:

2.1.1

Turbines shall be of the single - stage axial flow impulse type, designed for 3 years' continuous operation and 20 years' minimum service life. They shall be sufficient and economical in operation, substantially free of vibration and capable of being started automatically and quickly from cold condition.

2.1.2

The design shall be strictly as per API - 611 (Latest Edition). Customer / consultant documents are as per Annexure-I of purchase specification TC64515. Any deviation from the standard shall be indicated during quotation stage only.

2.2

DESIGN PHILOSOPHY / CRITERIA – GENERAL:

Selection of rotating equipment shall be based upon the following consideration.

- Suitability of the specified duty conditions.
- Standard models under vendor's regular range of manufacture.
- Proven track record in similar service.
- Optimum operating and maintenance costs.
- Maximum interchangeability of parts.
- Ease of operation and maintenance.

2.3

THE ORDER OF PRECEDENCE IS TO BE FOLLOWED:

- Customer / consultant Project orientated Turbine data sheets.
- Customer / consultant standard specification sent along with enquiry.
- BHEL purchase specifications.
- API standards.
- Applicable codes, standards

For design aspects not specifically covered by data sheets, specifications, codes and standards or regulations, the design shall be based on good engineering practices.

Vendor shall make all possible efforts to comply strictly with the requirements of this design basis. In case deviation is considered essential by the vendor (after exhausting all possible efforts), these shall be clearly brought out and consolidated under technical exception chapter at offer stage. However, vendor specific deviation (if any) to applicable codes / specifications shall be subject to Customer / consultant's approval during detail engineering.

Data sheets of auxiliaries indicating operating parameters, performance requirements, construction features, Instrumentation & controls, Inspection & testing etc. using respective API data sheet formats.

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PREP..BY : **M. S. Kumar**APP. BY : **SUNIL**DATE: **20.03.2017****COPY RIGHT AND CONFIDENTIAL**

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 HYDERABAD	PRODUCT STANDARD INDUSTRIAL TURBINES AND COMPRESSORS	TC 64515 Rev. No: 01 Page 2 of 11
	2.3.0 Technical requirements: 2.3.1 The Turbine shall have the following features: 2.3.1.1 Stainless steel nozzle 2.3.1.2 Low friction carbon sleeves 2.3.1.3 Stainless steel stationary and rotating blades. 2.3.1.4 5000 hr-L. 10 life bearings. 2.3.1.5 Manual governor speed adjustments. 2.3.1.6 Trip and Throttle valve integral to steam chest unless otherwise specified as separate – R01 2.3.1.7 Built in removable steam strainer. 2.3.1.8 Suitable for Automatic start-up without warmup. 2.3.1.9 Self-contained oil ring lubrication with water cooling. 2.3.2 The Turbine shall be suitable for auto start, rapid start and shall be in a position to accelerate with 10 seconds from cold condition to operating speed and full load. Hence at the stand still condition of turbine, the turbine Trip and control valves shall be in open and ready to start – condition. Vendor has to confirm the suitability of the turbine. The auto start equipment shall be in BHEL scope. Site conditions : [x] Hazardous [-] Non Hazardous 2.3.3 Area of Classification : Zone 2, Gas Group IIC Temperature class T3 2.3.4 Ambient temperature in °C : Max. 50 2.3.5 Type of Turbine required : [X] Horizontal [-] Vertical Inlet Steam pressure in Kg/cm²(g) : As per variant table. 2.3.6 Min / Normal / Max / Design Inlet Steam temperature in °C) : As per variant table. 2.3.7 Min / Normal / Max / Design Exhaust Steam pressure in Kg/cm²(g) : As per variant table. 2.3.8 Min / Normal / Max / Design 2.3.9 Output Power required : As per variant table. 2.3.10 Maximum power : As per variant table. 2.3.11 Normal continuous operation : As per variant table. 2.3.12 The turbine shall be capable of delivering power at the min. inlet pressure and max. Exhaust pressure, also the turbine shall be capable of delivering 10% extra power over the rated power by opening valve. Speed in RPM : As per variant table. 2.3.13 Direction of rotation when viewing : Clockwise (CW) 2.3.14 from Governor end. Exhaust & inlet nozzle orientation : Right hand side when viewed from coupling end. 2.3.15 Installation : [-] Indoor [x] Outdoor [-] Heated [x] Unheated [-] With roof [x] without proof Inspection Agency : [x] BHEL [x] EIL or Customer appointed agency. 2.3.16 M/s Lloyds is the approved Inspection agency, if the item is procuring from imported organization. The Inspection charges shall be included in main equipment price.	
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- 2.13.7 Turbine shall be designed to operate with entire range of inlet and exhaust conditions.
- 2.13.8 Steam turbine shall be fixed speed, back pressure type with Carbon rings. Any instrumentation, control etc., required to ensure the same is in vendor's scope of supply.
- 2.13.9 The steam turbine companion flanges, piping components and other instrumentation items shall be IBR certified
- 2.13.10 Vendor to furnish completely filled in ERP (if applicable) meeting all requirements of customer / EIL specification (If applicable) for BHEL/ EIL / customer approval / acceptance during offer stage.
- 2.13.11 Proper marking shall be provided for all loose parts.
- 2.13.12 General arrangement drawing to be submitted by connecting all loose parts supplying along the aux steam turbine.
- 2.13.13 Vendor to strictly follow the MAWP of Inlet & Outlet casing as per project specific datasheet (If applicable)

3.0.0 SCOPE OF SUPPLY:

- 3.1.1 Lube oil pump drive turbine along with seal (refer variant table for seal type), sentinel valve, Suction strainer with counter flange, Pressure gauges for Throttle steam, Nozzle Ring, Exhaust, Local gauge board/Instrument rack for mounting along with junction box of solenoid valve and proximity switch, Insulation cover, Remote trip solenoid, Remote start solenoid)
- 3.1.2 Required Instrumentation recommended by OEM with mounting board for local control panel.
- 3.1.3 Necessary tubing and cables to connect the instruments from turbine to local control panel.
- 3.1.4 Necessary fasteners along with gaskets for fixing loose items at BHEL's works.
- 3.1.5 Steam Consumption is to be guaranteed at site by the vendor. Make good is acceptable.
- 3.1.6 Others items in scope of supply as per enquiry.

3.2.0 SCOPE OF SUPPLY FOR COMMISSIONING SPARES:

- 3.2.1 Spare set of Gaskets (Casing Sealant - Copaltite) & "O" rings (Thread Sealant- Temptite) for lube oil pump drive turbine – 1 Set – **R01**

3.3.0 SCOPE OF SUPPLY FOR MADATARY SPARES (If Applicable):

- 3.3.1 Mandatory spares for lube oil pump drive turbine shall be as per enquiry.

3.4.0 2-YEAR NORMAL OPERATIONAL SPARES:

Vendor to submit offer for 2-year normal operational spares for lube oil pump drive turbine & its control equipment along with offer. The prices shall be quoted individually in the price format. Un priced bid format shall be sent along with offer.

The validity of spare price shall be one year after placement of main equipment order. The spare prices are to be considered while evaluating price comparative statement by BHEL

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4.0.0 RATING PLATES

A rating plate of non-corrosive material upon which shall be engraved manufacturer's name, Turbine type, Turbine model, Serial no. of Turbine, rating in KW, Speed in RPM, Steam consumption at operating condition, Inlet steam parameters, Exhaust steam parameters, Inlet steam temperature, Exhaust steam temperature and the essential parameters required.

These rating plates shall be of White non-hygroscopic material with engraved black lettering.

5.0.0 CLEANING & PREPARATION FOR COATING:

- 5.1.1 All coated surfaces shall be protected against abrasion impact, discoloration any other damages. All exposed threaded portions shall be suitably protected with either metallic or a nonmetallic protection device. The shaft ends of Turbine shall be properly sealed with suitable devices to protect them from damage. The parts which are likely to get rusted due to exposure to weather, should also be properly treated and protected in a suitable manner. All primers / paints / coatings shall take into account the hot humid, corrosive & alkaline, subsoil or over ground environment as the case may be.
- 5.1.2

5.2.0 PRESERVATIVE SHOP COATING:

All exposed metallic surfaces subject to corrosion shall be protected by shop application of suitable coatings. All surfaces that will not be easily accessible after the shop assembly shall be treated beforehand and protected for the life of the equipment.

All surfaces shall be thoroughly cleaned of all mill scales, oxides and other coatings and pre heated in the shop.

The surfaces that are to be finish painted after installation or require corrosion protection until installation, shall be shop painted with at least two coats of primer.

All other steel surfaces which are not to be painted shall be coated with suitable dust preventive compound subject to the approval of Customer / BHEL.

5.3.0 PAINT AND FINISH

- 5.3.1 Turbine external parts shall be finished and painted to produce a neat and durable surface, which would prevent rusting, and corrosion. The equipment shall be thoroughly degreased, all rust, sharp edges and scale removed and treated with one coat of primer and finished with two coats of final paint. The final paint shade will be informed during detailed engineering stage.

- 5.3.2 Material shall be properly packed to withstand mechanical damage and rust during transit. Vendor to submit the cleaning & painting specification along with offer.

6.0.0 SPECIAL NOTES:

- 6.1.1 Final documents as per clause 6.2.1 & 6.2.2 of BHEL specification TC 6 4515 Rev 01 shall also be furnished in C.D compatible for using in AutoCAD (Latest)
O & M manuals shall also be furnished in C.D compatible for using in MS-Word (Latest).
- 6.1.2 Vendor to submit the duly signed & stamped Annexure I to TC64515 Rev 01 along with offer as the same is mandatory for technical evaluation.

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7.0.0 DOCUMENTATION:

The list of engineering data would be a comprehensive one including all engineering data / drawings / information for all brought out items and manufacturing items

All the drawings/ documents submitted by the vendor during detailed engineering stage shall be stamped "For Approval" or For Information" prior to submission.

After the approval of the drawing, further work by the vendor shall be in strict accordance with these approved drawings and no deviations shall be permitted without the written approval of customer.

All manufacturing, fabrication and execution of work in connection with the equipment / system. Prior to the. Shall be at the vendor's risk. The vendor is expected not to make any changes in the design of the approval of the drawings equipment / system, once they are approved by customer.

However, if some changes are necessitated in the design of equipment / system at a later date. The vendor may do so, but such changes shall promptly be brought to the notice of customer indicating the reasons for the change and get the revised drawing approved again in strict conformance to the provisions of the technical specification.

The no of copies / prints/CD/manuals to be furnished as follows:

Drawings, Data sheets, Curves for Information / approval 3 prints & 1 CD

Final Drawings, Data sheets, Curves for Information / approval 3 prints & 1 CD

Performance and functional guarantee test reports 10 prints & 1 CD

7.1.0 DRAWINGS, DATA TO BE FURNISHED

7.1.1 Documents to be sent along with offer (2 copies) (Without following data, offers will not be considered.)

7.1.1.1 Technical data required as per BHEL & EIL/Customer/API Specifications.

7.1.1.2 General arrangement drgs. / Catalogues giving with full sectional views. (Including basic dimensions, flange & shaft end details, inlet, exhaust, drains, leak-off, and bearing housing connections.)

7.1.1.3 Cross-sectional drawing with bill of material.

7.1.1.4 Filled in EIL/ Customer data/API 611 datasheet of LOP drive Turbine.

7.1.2.2 Cross-sectional drawing with bill of material of LOP drive Turbine.

7.1.2.3 Filled in ERP of LOP drive Turbine.

7.1.2.4 Performance curve of the Turbine.

7.1.2.5 Quality assured plan.

7.1.2.6 Carbon Rings GA drawing.

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8.2.0 8.2.1 8.2.2 9.0.0 10.0.0 10.1.0 10.2.0 11.0.0	<u>GUARANTEE CERTIFICATES:</u> A guarantee certificate for 18 months of trouble free performance from the date of shipment or 12 months from the date of commissioning whichever is earlier shall be supplied. If any mal-performance or defects occur during the guarantee period, the vendor shall make all necessary alteration, repairs, or replacement free of charge <u>PACKING:</u> The equipment shall be properly packed to withstand mechanical damage and rust during transit. Packing and shipment shall be as per API - 611 Clause 4.4. Packing shall be suitable for 24 months' storage period. <u>MARKING:</u> In addition to the marking as per API - 611, BHEL 12-digit material code number shall be provided at suitable place. All the items shall be properly marked with tag number provided the sketch enclosed to this specification. The following details shall be marked on the packing case for each consignment. a) Manufacture's Name b) BHEL Order number. c) BHEL Standard Number d) BHEL Material Code Number. e) Description of the item <u>Enclosures to be followed:</u> Annexure –I to Purchase Specification TC64515 Rev01 Annexure –II to Purchase Specification TC64515 Rev01 Annexure –III to Purchase Specification TC64515 Rev01 Annexure –IV to Purchase Specification TC64515 Rev01 Annexure –V to Purchase Specification TC64515 Rev01		
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Var No	Nor/M ax Power in KW	Inlet Steam pressure in Kg/cm ² (g) Min / Normal / Max / Design	Inlet Steam temperature in °C) Min / Normal / Max / Design	Exhaust Steam pressure in Kg/cm ² (g) Min / Nor / Max / Design	Customer data sheet number	BHEL material code
	22 / 40.7	18.5/19.0/20.5/ 22	210/220/240/24 5	3.0/3.5/4.0/5.0	API 611 V Ed datasheet	
01	SGL STG ST TURB 1450RPM					TC9764515010
02	SET OF DYNAMICALLY BALANCED ROTOR FOR LOPDT					TC9764515029
03	SET OF COMPLETE SHAFT SEAL ASSY FOR LOPDT					TC9764515037
04	SET OF BEARINGS FOR LOPDT					TC9764515045
05	SET OF GASKETS & O RINGS FOR LOPDT					TC9764515053
06	SELF POWERED DIGITAL TACHOMETER FOR LOPDT					TC9764515061
07	EXPANDER/REDUCER & PIPE FITTINGS ALONG WITH COUNTER FLANGES TO SUIT THE INLET & EXHAUST SIZES OF LOPDT AS PER ANNEXURE – VI TO TC64515					TC9764515070
08	LEAK OFF/ DRAIN ALONG WITH COUNTER FLANGES & STEAM TRAP ASSY FOR LOPDT					TC9764515088
09	Pressure Gauge (20% of each type) --- 1 Set or Minimum 2 Nos(Whichever is higher)					TC9764515096
10	Temperature Gauge (20% of each type) --- 1 Set or Minimum 2 Nos(Whichever is higher)					TC9764515100
11	RTD's with Thermowell (20% of each type) --- 1 Set or Minimum 2 Nos(Whichever is higher)					TC9764515118
12	SGL STG ST TURB 1450RPM					TC9764515126

Var No	Nor/Ma x Power in KW	Inlet Steam pressure in Kg/cm ² (g) Min /Nor. / Max / Design	Inlet Steam temp in °C) Min / Normal / Max / Design	Exhaust Steam pressure in Kg/cm ² (g) Min / Nor / Max / Design	Exhaust Steam temp in °C) Min / Normal / Max / Design	Customer data sheet number	BHEL material code
	22 / 40.7	14.5/15.5/17. 0/21	230/250/270/ 290	3.3/3.8/4.4/10	160/175/200/ 225	API 611 V Ed datasheet	APL SYN Gas Turbine
13	Lube oil pump Drive Turbine 1450RPM with Carbon Rings seal (22/40.7 kw)						TC9764515134
14	TACHOMETER (Self-powered) FOR LOPDT						TC9764515142
15	SPARE SET OF GASKETS & ORINGS FOR LOPDT						TC9764515150
16	Expander/Reducer & fittings to suit Inlet & Exhaust						TC9764515169
17	Leak off/Drain & Steam Trap Assy for LOPDT						TC9764515177
18	Cooling water inlet & outlet for LOPDT						TC9764515185
19	Spare set of dynamically balanced rotor for LOPDT with N2 container.						TC9764515193
20	Spare set of Carbon Rings Seal for LOPDT						TC9764515207
21	Spare set of Bearings (DE & NDE) for LOPDT						TC9764515215
22	Spare set of PRESSURE GUAGE (10% OF EACH TYPE)						TC9764515223
23	Spare set of TEMPERATURE GUAGE (10% OF EACH TYPE)						TC9764515231
24	Spare set of RTD's with THERMOWELL (10% OF EACH TYPE)						TC9764515240
25	Spare SOLENOID VALVE (10% OF EACH TYPE)						TC9764515258
26	Spare PROXIMITY SWITCH (10% OF EACH TYPE)						TC9764515266

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27	Lube oil pump Drive Turbine 2950RPM, 45/55KW rating and Carbon Rings as seal (refer clause 3.0.0 of TC64515), with the following parameters -						TC9764515274
	Nor/ Max Power in KW	Inlet Steam pressure in Kg/cm2(g) Min /Nor. / Max / Design	Inlet Steam temp in °C) Min / Normal / Max / Design	Exhaust Steam pressure in Kg/cm2(g) Min / Nor / Max / Design	Exhaust Steam temp in °C) Min / Normal / Max / Design	Customer data sheet number	
	45 / 55	12/13.5/16/20	275/300/325/ 335	1.0 to 3.0/4.0 / 5.0 /7.5	200/225/250/ 275	API 611 V Ed	
28	Tachometer (powered) for LOPDT						TC9764515282
29	Spare set of Gaskets (Casing Sealant - Copaltite) & "O" rings (Thread Sealant - Temptite) FOR LOPDT						TC9764515290
30	Steam inlet and exhaust piping with Expander/Reducer & fittings to suit Inlet & Exhaust with companion flanges						TC9764515304
31	Leak off/Drain piping & Steam Trap Assy for LOPDT						TC9764515312
32	Cooling water inlet & outlet piping for LOPDT						TC9764515320
33	Spare set of Bearings (DE & NDE; Radial & Thrust) for LOPDT						TC9764515339
34	Spare set of Oil seals (Isolator), steam seals (set of Carbon Rings) & Interstage Seals (if applicable) for LOPDT						TC9764515347
35	Spare set of Complete Hydro-mechanical Governor for LOPDT						TC9764515355
36	Spare set of Pressure Gauge (10% of each type)						TC9764515363
37	Spare set of RTD's with Thermowell (10% of each type) with provision for Transmitter						TC9764515371

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<u>RECORD OF REVISIONS.</u>				
Rev. No	Date	Revision Details	Revised	Approved
00	20.03.17	First issue	----	----
01	03.12.19	Revised as marked.	Sunil B Jiwtode	P S V S K
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MATHURA REFINERY
MECHANICAL MAINTENANCE
TECHNICAL SPECIFICATION

REF:
TPS/MM

December 18, 2017

TECHNCIAL SPECIFICATION FOR INSTRUMENT ITEMS



1. List of Applicable Standards

Design and terminology shall comply, as a minimum, with the latest edition prior to the date of purchaser's enquiry with following codes, standard practices and publications:-

ANSI/ASME: American National Standards Institute/American Society of Mechanical Engineers.

B 1.20.1: Pipe Threads General Purpose (Inch)

B 16.5: Pipe Flanges and Flanged Fittings

B 16.20: Metallic Gaskets for pipe Flanges, Ring Joint, Spiral wound and Jacketed.

ANSI/FCI: American National Standards Institute/Fluid Control Institute
70.2: Control valve seat leakage classification

API: American Petroleum Institute

API 520: Sizing, selection and installation of pressure relieving devices in refineries.

Part-I - Sizing and selection

Part-II - Installation

API 521: Guide for pressure relieving and depressurising systems.

API 526: Flanged steel Pressure Relief Valves.

API 527: Seat tightness of Pressure Relief Valves.

API MPMS: Manual of Petroleum measurement standards.

API RP 551: Process Measurement Instrumentation

Part I - Process Control and Instrumentation

API 522: Transmission Systems.

S 2000: Venting Atmospheric and low-pressure storage tank nonrefrigerated and refrigerated.

S 670: Vibration, Axial-Position and Bearing-Temperature Monitoring Systems

ASME: American Society of Mechanical Engineers

ASME: Sec-VIII Boiler and Pressure Vessels Code rules for construction of pressure vessels

ASME: Sec-I Boiler and Pressure Vessels Code. Section-I 'Power Boilers'

ASTM: American Society for Testing and Materials.

BIS: Bureau of Indian Standards

BS: British Standards



MATHURA REFINERY
MECHANICAL MAINTENANCE
TECHNICAL SPECIFICATION

REF:
TPS/MM

December 18, 2017

BS-5308 Part-II: Specification for PVC insulated cables.
BS-7244: Flame Arrestors.

DIN: German Standards
DIN-43760 Temperature Vs Resistance curves for RTDs.

DIN-19234 Electrical Distance Sensors; DC interface for Distance Sensor and Signal Converter.

EN-10204: Inspection Documents for Metallic Products

IBR: Indian Boiler Regulations

IEC: International Electro technical Commission

IEC 60079: Electrical Apparatus for Explosive Gas atmosphere
IEC 60085: Thermal Evaluation and Classification of Electrical Insulation.
IEC 60332: Test on bunched wires or cables.
Part III Cat. A
IEC 60529: Degree of protection provided by enclosures.(IP code)
IEC 60534-2: Industrial Process Control Valves-Flow capacity.
IEC 60584-2: Thermocouple Tolerances
IEC 60751: Industrial Platinum Resistance Thermometer Sensors
IEC 61000-4: Electromagnetic compatibility for Industrial Process measurement and control equipment.
IEC 61158: Foundation Fieldbus Specifications

IS: Indian Standard

IS-5: Colours for ready mixed paints and enamels
IS-319: Specification for free cutting Brass bars, rods and sections
IS-1239: Mild steel tubes, tubulars and other wrought steel fittings.
IS-1271: Specification of Thermal Evaluation and Classification of Electrical Insulation
IS-1554: PVC insulated (heavy duty) electric cables working
Part I -voltage up to and including 1100V
IS-2074: Ready mixed paints, air drying, Red oxide - zinc chrome
IS-13947: Degree of Protection provided by Enclosures for Low Voltage Switchgears and Control gears. Part 1 General Rules.
IS-2148: Flame proof enclosures for electrical apparatus for Explosive Gas Atmospheres – Flameproof Enclosures ‘d’
IS-3624: Specification for pressure and vacuum gauges
IS-5831: PVC insulation and sheath of electric cables.
IS-7358: Specifications for Thermocouples
IS-8784: Thermocouple compensating cables.



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ISA:	International Society of Automation
S-5.2:	Binary logic diagrams for process operations.
S-7.3:	Quality standard for instrument air
S-75.01:	Flow equations for sizing control valves.
ISO 5167:	Measurement of fluid flow by means of orifice plates, nozzles and venture tubes inserted in circular cross-section conduits.
NACE:	National Association of Corrosion Engineers
NEC:	National Electric code
NEMA:	National Electrical Manufacturer's Association
ICS-6:	Enclosures for Industrial control and systems.
NFPA:	National Fire Protection Association
NFPA-496:	Purged and pressurized enclosures for electrical equipment.
OSHA:	Occupational Safety and Health Authority.
SAMA:	Scientific Apparatus Maker's Association

2.Design Philosophy/Criteria – General

- 2.1 All instruments and equipments shall be suitable to be used for specified site climatic conditions and industrial environment in which corrosive gases and/or chemicals may be present. As a minimum, all instruments and enclosures in field shall be dust proof and weatherproof to IP-65 as per IEC-60529/ IS-13947 and secure against the ingress of fumes, dampness, insects and vermin. All external surfaces shall be suitably treated to provide protection against corrosive plant atmosphere.
- 2.2 The design of electronic instruments shall be in compliance with the electromagnetic compatibility requirements as per IEC 61000-4 'Electromagnetic compatibility for Industrial Process measurement and Control equipment'.
- 2.3 Material of construction and end connection rating shall be as per piping material specification as a minimum.
- 2.4 Smart transmitters wherever used shall be with an accuracy of $\pm 0.075\%$ of span with a rangeability of 100:1 unless specified otherwise. Hand held communicator shall be supplied for smart transmitters and fieldbus transmitters. All transmitters shall have minimum static pressure rating of 100 kg/sq.cm.g.



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2.5 Threaded end connections shall be to NPT as per ANSI B 1.20.1. Flanged end connections shall be as per ANSI B 16.5.

2.6 All instrument installation shall be remote type except where close coupled is specifically required for a particular service.

2.7 All cable entries to junction boxes shall be from bottom.

2.8 All terminals shall be screwed clamp type of Phoenix, Wago or Weidmuller make.

2.9 Solenoid valves used shall be as per area classification. Solenoid coil shall be rated for continuous operation of the upper limit of supply voltage (i.e. rating shall be 220 V DC continuous). Class H rating for solenoid valves preferable.

3.Design Criteria/Requirements - Specific Applications

3.1 Temperature Instruments

4.1.1 Thermowells

a) Thermowells shall be minimum of SS316 or better material to suit the service conditions. Flange materials shall be as per piping specification. Flange rating shall be minimum 300#.

b) These shall be fabricated from bar-stock.

c) Immersion length of thermowells for different line sizes shall be as follows:-

Line Size	Immersion length (U)
4" to 6"	280 mm
8" and above	320 mm
Vessels	400 mm

Immersion length is based on 200 mm length between flange face and inner wall of pipe or vessel. In vessels where fouling with vessel internals is expected or where the length between flange face and inner wall of vessel is more than 200 mm, the immersion length shall be suitably modified ensuring that minimum 150mm thermowell projection length is available inside the vessel from the vessel inner wall.

d) Built-up thermowells may be considered in low pressure and low velocity services like infired heaters and also where longer thermowell immersion length is required (for greater than or equal to 500 mm).

3.1.2 Thermocouples



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a) Thermoelectric properties and tolerances shall be as per IEC 60584-2. The elements shall be 18 AWG for simplex thermocouples.

3.1.3 Temperature transmitters shall be provided for all temperature elements in both closed as well as open loops unless otherwise specified. Temperature elements shall be RTD type. Thermocouples may be used where RTDs are not suitable for a process application.

3.1.4 Temperature Gauges

All temperature gauges are to be bimetallic type in general. Case material shall be SS304. Filled type temperatures gauges are envisaged where thermowell length more than 600 mm is required, services with high vibration, gauges located in inaccessible locations and for underground locations. Filled system if used shall be gas filled type.

3.2 Pressure Instruments

3.2.1 Case material for pressure gauges shall be SS304. All pressure gauges with ranges 0 to 100 kg/cm²g and above shall have safety type, solid front case. Dial size for gauges shall be 150 mm.

3.2.2 All transmitters shall have an integral display. Remote mounted meters may be provided for specific applications.

3.2.3 Diaphragm seal element (Teflon coated) with capillary shall be used for congealing, corrosive and highly viscous services.

3.2.4 Dial markings and colours shall be as per the following:

0 to 30%	:	Yellow
31 to 70%	:	Green
71 to 100%	:	Red

3.3 Level Instruments

3.3.1 Magnetic Gauge glasses for level gauging at field shall be used. Multiple level gauges shall be used for visible lengths more than 1470 mm.

3.3.2 Guided wave radar level transmitter shall be used for level monitoring in DCS for each tank.

3.3.3 Level standpipe philosophy



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a) The usage of standpipe shall be considered for clean, non-viscous and non-crystallizing services. The size of standpipe shall be 2" NB minimum. Separate isolation valves to be considered for standpipe unless otherwise specified.

b) Standpipe shall be used if there are more than 4 nozzles required for level instruments.

3.4 Flow Instruments

3.4.1 Primary Devices

The primary element shall generally be thin plate, square-edge concentric orifices plate mounted between a pair of weld-neck type orifice flanges with flange taps. The minimum pressure rating of flanges shall be 300 lb ANSI.

Eccentric and Segmental type of orifice plates shall be used for specific applications. Quadrant edge or conical entrance orifice plates shall be used for services with low Reynolds number.

3.5 Control Valves

3.5.1 General

a) Control valves shall normally be globe type.

b) All on-off type valves shall be ball type valves.

3.5.2 Trim Designs

Material used for Trim shall be minimum 316L SS withstellite. Special cases may require other materials like Hastelloy, Monel etc.

3.5.3 Actuators

a) Diaphragm actuators shall generally be used with 0.2 - 1.0 kg/cm² g spring range. For larger DP shut offs, higher spring range/higher areas shall be considered.

b) Piston actuators can be considered for severe pressure drop services.

3.5.4 Limit switches

All limit switches shall be proximity type only as per NAMUR (DIN 19234).

3.5.6 Smart positioner shall be required.

3.5.7 SS tube of 6 mm shall be required for tubing purpose.



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3.5.8 For on-off valve 220VDC SOV rating shall be required.

3.6 Electrical Field Wiring

3.6.1 Instrument electronic signal, control cables, single pair as well as multipair shall be 1.5 mm² twisted in pair shall be individually and overall shielded (in case of multipair) with aluminium Mylar tape with drain wire and armoured.

3.6.2 Multicore extension cables for Thermocouples, wherever applicable, shall be 20 AWG single conductor twisted pairs, armoured, individual pair and overall aluminium mylar shielded with over all drain wire. Single pair extension cables shall be armoured cable with 16 AWG single conductor wire.

3.6.3 Power supply cables to field instruments shall be minimum 2.5 mm² armoured.

3.6.4 All cable glands shall be of nickel-plated brass and they shall be of double compression type suitable for armoured cables.

3.6.5 Generally PVC insulated cables shall be used. Insulation type shall be verified by respective vendor during detailed engineering and selected as required.

3.6.6 For longer distances conductor sizes shall be selected based on voltage drop.

3.7 Cable Trays And Cable Ducts

3.7.1 All cables on the main pipe rack shall be laid in Aluminium cable duct / tray with cover.

3.7.2 All branch cables shall run on cable trays. The Ladder trays and Angle trays shall be of Aluminium type.

3.7.3 Cable tray laying to take care of the necessary clearances for fire proofing of structures.

3.8 Speed probes

All speed probes shall be 4-20mA type. The same shall be configured to DCS.

4. Bidder's Scope of Supply/Works

4.1 General

Vendor shall be responsible for implementation of complete instrumentation and controls on turnkey basis with scope of work as listed below, but not limited to the following:



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- Design and Engineering.
 - Procurement, Supply, Fabrication, Factory testing and Acceptance, Transportation, Storage and Construction.
 - Installation, field calibration/testing, commissioning and site acceptance.
- Supply of all the instruments for local indication & Instruments required for interlock & controls. Vendor shall provide Junction boxes , all types of cables for wired instruments upto DCS & PLC located at 400 Metres from the Steam turbine

The descriptions and requirements contained in this specification are concise by necessity and cannot include all details. However, it is the responsibility of the vendor to execute the job on a turnkey basis in accordance with the specifications and internationally recognized good engineering practices for smooth and successful operation.

4.2 Scope of supply

Supply of all items related to instrumentation and control system is in the scope of Vendor. The scope of supply shall include but will not be limited to the following:

4.2.1 Hydraulic governors shall be used for steam turbine MOP. Vendor to supply suitable Hydraulic governors.

4.2.2 All types of field instrumentation including Transmitters, Pressure and Temperature Gauges, Guided wave Level transmitters, Level Gauges, Self actuated Pressure control valves, Thermowells, Thermocouples, Orifice assemblies, Solenoid Valves, all types of Control Valves & shutdown valves with accessories, speed probe, vibration probe, Cables, JBs, Gland, Cable trays and any other special instruments required as per finally approved P&IDs and other documents generated by vendor as required to complete the job in all respect.

4.2.3 All installation and erection materials such as impulse piping, pipe fittings, valves and valve manifolds, tubing, tube fittings, cable tray, duct, RCC trenches and tray, duct/tray supports, all types of consumables and accessories for mounting all instruments, instrument air supply distribution, steam tracing etc. and instrument supports, prefabricated canopies/ sunshields for all field mounted instruments and panels/cabinets as required to complete the job in totality.

4.2.4 All type of indoor & outdoor cables such as signal, control, thermocouple extension, RTD, Power cable, including special cables (like System cables, Serial cables etc.), fibre optic cables etc. including all required accessories between:

- i) Individual Instruments to field Junction Boxes.
- ii) Equipment/ instrument to local panel.
- iii) Local panel to junction box
- iv) Field junction boxes to Central control room.



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- v) Power distribution boards in Central control room to field instruments/local panels
- vi) All earthing cables and strips (Cu) for items including junction boxes, thermocouple head, field instruments etc.
- ix) All types of cables between Vendor supplied equipments inside the Central control room including those between cabinets shall be in the Vendor's scope.

4.2.5 Junction boxes and cable glands for different types of signals such as intrinsically safe and non-intrinsically safe 4-20 mA, thermocouple, RTD, shutdown (for solenoid valves), switch contacts alarm, power etc shall be in Vendor's scope.

4.2.6 Local control panel/local gauge boards and accessories.

4.2.7 Copper earthing strip & earthing cables for earthing of all instrumentation items including junction boxes, thermocouple head, field instruments etc., to existing earthing strip shall be in vendor's scope.

4.2.8 Any other erection material necessary for installation and commissioning of other special instrument systems or equipment, if any shall be in vendor's scope.

4.2.9 Supply of commissioning spares for all instrumentation.

4.2.10 Supply of drawings and documents as listed elsewhere.

4.2.11 Additional speed probes for local & control room indication along with cables ,Jbs etc.

4.2.12 Insulation & painting requirements for instruments, impulse lines and sample lines.

4.2.13 Vendor shall supply 3 nos of spare speed probes for future use.

4.2.14 For all trip interlocks 3 separate instruments shall be used in field. Vendor shall supply all such instruments along with cable, JB etc upto control room.

4.2.15 Any special tools or tackles required for instrumentation items.

4.2.16 Only DCS/PLC hardware is in owners scope of supply. DCS engineering shll be done by owners engineers

4.3 Installation, Field testing/calibration& Commissioning

4.3.1 Installation

Vendor shall carry out installation of all instruments as per document Job Standard specification for instrumentation work, and other standard specifications included in the Bid Package.

4.3.1.1 This activity shall include but will not be limited to installation of all field mounted instruments/ items, including sub-package items, installation of local panels, junction boxes, gauge boards, interconnection between instrument & junction boxes, fabrication, laying of



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cables trays & ducts, fabrication & laying of cable trenches, laying of all types of cables single pair & multi-pair from field to Control rooms / local panels / inside the control rooms system cable termination within Central Control room, tagging, ferruling, glanding & Pair/core identification of all the field cables. Painting of cable trays & ducts shall only be provided wherever it is unavoidable due to any welding carried out at site.

4.3.1.2 Insulation of instruments, impulse lines, sample lines if required.

4.3.2 Testing and Calibration

Testing of all items & systems at site including impulse lines, instrument air lines, pneumatic signal tubes and instrument cables including special instruments/items if any, and calibration of all instruments shall be carried out as per the requirements in various specifications in the Bid Document & vendor recommendation.

4.3.3 Commissioning

The co-ordination and assistance for start-up, commissioning and stabilization of plant, with IOCL and vendors of various items shall be the total responsibility of Vendor.

In case of special instrument items, the installation shall be done under the supervision of that system/ instrument vendor's personnel. It is the responsibility of vendor to co-ordinate and to make available the specialist's services from vendors at the time of installation, testing and commissioning. Vendor's scope of work shall include loop checking & pre-commissioning of completely integrated instrumentation & control system including sub-package system items supplied by vendor in line with requirement specified elsewhere in this package.

Vendor shall make all modifications and/or changes, found necessary, during loop testing/pre-commissioning/commissioning. All such changes shall be certified by the IOCL representative as per the procedure set up at site by Engineer-in-charge. All change found necessary in the /interlock logics & Pre-commissioning/loop testing/Commissioning shall be certified by vendor package sub-supplier, machinery supplier, IOCL operator-in-charge. Any change in logic shall be carried out by existing DCS/PLC vendors. Vendor shall contact and line up existing DCS/PLC vendor for the same.

4.3.4 System Acceptance at site

In case of system oriented items, vendor shall be fully responsible to demonstrate to IOCL all functional requirements specified in this document including their performance in the actual plant environment. This activity shall be coordinated by vendor with other vendors, as necessary.

4.3.5 Guarantee



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5.4.6.1 The Vendor shall guarantee that all equipment and components supplied by him shall be new and of first quality and performance shall be as per specification, approved drawings and documents and shall possess all the features as claimed in their manuals.

5.4.6.2 Vendor should also post one Service Engineer at site till the satisfactory performance of the system is established by trial runs & handing over system to Owner.

5.4.6.3 Performance guarantee will be inline with the one submitted for entire system

5.4.6.4 In case the vendor is not the original equipment manufacturer for the supplied system, then the Warranty and Guarantee provided by the vendor has to be supported with a back-up Warranty and Guarantee certificate from the Original Equipment manufacturers agreeing to all the clauses under the Warranty and Guarantee as given above. Hard copy certificates against the same has to be produced by the vendor.

5. Jobs Specifications

5.1 General

The Vendor's scope includes Design, Engineering (including residual engineering), procurement, supply, shop and field-testing, installation/erection, commissioning, supply of spares, documentation, etc. on a turnkey basis for its successful commissioning and operation for the entire unit with all associated works, complete field instruments including all packages, control and interlock system.

5.2 Design Requirements

This design requirement is in addition to Instrumentation Engineering Design attached. Wherever there is a contradiction, these design requirements including various Specifications/ Standards referred shall take precedence.

5.2.1 Area Classification

All field Instrumentation including junction boxes and cable glands shall be weatherproof and suitable for safe area. However, all analog inputs / outputs to the existing DCS shall be provided with external isolators by the Vendor. Also, all Digital inputs/ outputs including those to Substation/Switchgear/MCC shall be provided with relay isolation by Vendor.

Vendor shall select the isolators based on the following requirements (for all the control systems to be supplied by vendor)

- i) The isolators shall be of latest/ enhanced available versions of makes selected.
- ii) The model no. selected should be well proven as per the criteria specified.



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- iii) The isolators selected should have back-up support and representative available locally.
- iv) The isolators shall be of MTL/ P&F. Approval of actual model number shall be obtained from Owner representative before proceeding.

5.2.2 Instrumentation Design Philosophy

The type of instruments shall be as per the requirements of process schemes and P&IDs. Engineering Design Basis, design selection criteria for instruments and the process requirements and various specifications, standards enclosed with this bid specification shall also be followed by vendor.

5.2.3 Multi Cables

All multicore cables between field / control rooms shall be as per requirements. All the cabling (branch & multicore) is in vendor's scope.

5.2.4 Junction Box:

Separate junction boxes shall be used for the following:

- a) 4-20 mA DC signals
- b) Thermocouples, wherever used
- c) RTDs, wherever used
- d) Contact signals (push buttons etc.)
- e) Interlock and shutdown signals (Solenoid valves)
- f) Power supply to various instruments

5.2.5 Installation Standards:

- i) All process hook-ups for instruments shall be in line with the typical installation standards attached along with this package. For the instruments, where installation standards are not available in this package, Vendor shall develop the same in-line with typical installation standards attached along with this package. The instrument purging and flushing shall be carried out by Vendor as per requirement of P&IDs or as required due to process condition.
- ii) After installation of instrument seal welding shall be provided as per instructions of Owner at site in addition to the requirement of piping material specification. Based on installation standards for each type of instruments, Vendor shall prepare Bill of Material (BOM), which shall indicate the requirement of various installation materials required for installation of each instrument. For impulse piping of pressure gauges full threaded coupling instead of union is to be used.
- iii) All transmitters, instruments and instrument connections should generally be accessible from the ground or permanent platforms. Vendor to note that all isolation valves and vent/ drain valves shall be gate valves even though globe valves are indicated in typical standards attached.



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- iv) Vendor to consider 1/4" OD SS tubes and fittings such as male connectors etc.

6 TECHNICAL SPECIFICATIONS

6.1 Instruments

Vendor to note that Engineering Design Basis shall be followed primarily for the specifications for instruments, however the following points also have to be read in conjunction while procuring the instruments:-

6.2 Control Valves

In case multiple valves are required to be installed because of controllability or rangeability requirement, the same shall be provided by vendor irrespective of representation shown in the P&ID.

6.3 Smart Positioner

For control valves, Smart positioners with HART protocol shall be used. The smart positioners shall be provided with necessary hardware/ software for maintenance, advanced diagnostics, programming etc. While selecting the make and model no. of the positioner, Vendor must ensure the provenness of positioner and control valves meeting PTR requirements as specified in this package.

Vendor shall provide smart positioners from any one of the following makes only:-
Fisher, Metso, Dresser.

6.4 For DP transmitter, integral valve manifold shall not be co-planer type. Conventional type valve manifold shall be provided.

6.5 Local Indicators

Turbine speed shall be made available at control room. However local indicators shall also be provided to display speed in field.

6.6 Auto logic

Instrumentation system for any Auto start of motor shall be 1002. There shall be 2 nos. of instruments for auto start logic. Logic shall be configured in PLC for 1002.

6.7 Trip logic

Instrumentation system for any trip shall be 2003. There shall be 3 nos. of instruments for trip logic. Logic shall be configured in PLC for 2003.

6.8 Drain and Emergency oil Tank level



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2 nos of guider wave radar level instruments and one no of level gauge shall be installed in each tank.

7 LOOP CHECKING

Vendor is totally responsible for all the work related to loop checking including cable laying, dressing, identification, ferruling & tagging, termination, calibration, loop testing. The detailed procedure is as outlined in standard specification for instrumentation works and other Standard specifications. Vendor shall follow the same for all control systems being supplied by vendor. The termination and identification of field cables, checking of interconnection between instrument/equipments inside control room and performing loop checking for control system supplied by vendor shall be in vendor's scope. Loop testing shall be conducted to check the functional performance of all elements of loop, thereby ensuring proper interconnection and operation.

Before proceeding for loop checking, the calibration results of individual elements shall be recorded on Vendor's supplied Performa, which shall be approved by Owner for correctness of installation, measurement and calibration results. After loop testing is complete, vendor shall connect back any termination and connection removed for loop checks out at the field end.

Vendor shall complete all entries of loop sheet related to field Instrumentation including, installation check, interconnection of tubing/cabling, hydro testing, etc. And get them approved by Owner. All loop sheets duly filled and signed shall be handed over to Control System Vendor for records. Vendor's scope shall also include Coordination with OWNER for serial linking of vendor's supplied PLC to OWNER supplied DCS.

6.7.1 Vendor List

Vendor List for Instrumentation items is provided in these specifications. Vendor shall consider the instrument supplier as identified in the Vendor List. Vendor list provided in the package is for the Make only, and not for any specific Model. For any instrumentation item, the offered model for the same must meet the specification and proven track record (PTR) requirement. All instrumentation items as per approved vendor list shall be supplied according to enlistment for sizes, ratings, material etc.

6.7.2 Electrical-Control & Instrumentation Interface

Instrument electronic signal (non FF), control& alarm cables, single pair as well as multipair shall be 1.5 mm² twisted in pair shall be individually and overall shielded (in case of multipair) with aluminium Mylar tape with drain wire and armoured.

6.7.3 Instrument process data may or may not be available in full or part in the Package. Vendor shall prepare Process datasheets for all instrumentation in extreme case where no data is available for any instrument, and complete instrument process data sheets where data is partially available. Based on the same, instrument data sheet/ specification shall be prepared. Sizes for Control Valves and Pressure Relief Valves if provided in the P&IDs are indicative



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only. Vendor to verify all Sizes and procure or carry out detailed engineering based on the same. Vendor shall size where these are not provided. For all Flow Instruments, particularly Orifices, if any change in line size is required, the same shall be carried out by Vendor after approval from Owner. The increase/decrease of line size/instrument is in vendor's scope. Vendor shall execute the project based on specifications/Standards, etc. in this bid document. In carrying out so there will be some differences from the P&ID. As a part of residual engineering, Vendor shall correct/update the P&IDs as procured/engineered. Wherever there is a change in the P&IDs due to various specifications, the same shall be incorporated in the as-built P&ID by Vendor.

6.7.4 Vendor to note that the design of thermowells shall be as per drawings / documents attached in the package. However the selected thermowell design must have the proven track record for use in similar applications of UFS. Vendor shall carry out the vibration analysis of the thermowells as per ASME PTC 19.3 standard and shall provide suitable design for the thermowells wherever necessary.

6.7.5 Routing, laying and supply of all cables between vendor supplied equipments inside the Central Control Room including those between PLC/DCS Consoles, Power supply cabinets, MCC, Switchgear etc. shall be in the Vendor's scope. All perforated trays shall be provided with cover.

6.7.6 All field instruments and junction boxes shall be provided with prefabricated canopy made of GI sheet with bolted construction.

6.7.7 Slipper type PVC sleeves shall be used over cable glands for all cable entries in junction boxes to avoid water entry in junction boxes.

8 COMMISSIONING SPARES

Commissioning spares shall be supplied as required for commissioning the plant. The same shall be included in Vendor's Bid. Vendor shall procure these spares as per recommendation of Vendors/Suppliers and these shall be available at the time of commissioning. These shall include all instrumentation and control items including sub-package items.

9 DRAWING/DOCUMENT APPROVAL FOR FACTORY ACCEPTANCE

All the drawing/document submitted by Vendor shall be for review or for record as detailed elsewhere in Drawings / Documents requirement section. For an individual item when inspected at shop shall be based on drawing/ documents marked with review code and approved by Vendor.

DOCUMENTATION & SOFTWARE TO BE PROVIDED BY VENDOR

1. All Drawings and Documents to be furnished by the vendor both in hard and soft copies. Soft copies of drawings/documents shall be in MS Office 2007 package, Autocad 2010.
2. Drawings / documents shall be provided by vendor as per following breakup:-



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Turbine for MOP(Details to be freeze and filled while offering items)

OPERATING CONDITIONS FOR Steam Turbine Power kW								
	Power KW	Speed RPM	Steam Rate Kg/kW- Hr	Inlet steam (Min, Norm, Max)		EXHAUST (Min, Norm, Max)		Hand valve Position
Press Kg/cm ² (g)				Press Kg/cm ² (g)	Temp ° C	Press Kg/cm ² (g)	Temp ° C	
PUMP NORMAL				12	275	4	200	Closed/closed
TURBINE RATED				13.5	300	4.5	225	Closed/closed
Maximum Condition				16	325	5	250	Closed/closed
Turbine Speed Range:				Turbine Trip Speed:				
CONSTRUCTION								
Design Specification:	API 611 latest Edition			Bearings:				
Casing:				Radial Bearing Type:		Journal sleeve bearings		
Turbine Type:	Horizontal			Thrust Bearing Type:		Ball thrust bearing		
Number of Stages:	1/2			Lubrication Type:		Non Pressurized lubrication		
Casing Support:	Centerline			Oil Type:		Mineral Base		
End Seal Type:	Carbon rings with brush seals			Hand Valve		No Hand Valve		
Interstage Seal Type:	As applicable			Trip:		Integral to the steam chest		
Rotor:								
Construction:	Between bearing, Built-up with forged shaft and discs			Nozzle:		SIW nozzles specified		
Blading	Profile SiW blading specified			Expected Sound Level @ 1M:		85 dBA		
MATERIALS								
High Pressure Casing:	To be specified by vendor							
Exhaust Casing:	To be specified by vendor			Inlet strainer		Stainless Steel		
Nozzles:	AISI 410							
Rotor Shaft:	AISI 4340 forged							
Rotor Disks:	AISI 4340 forged							
Rotor Blading:	X20Cr13							
TURBINE ONLY - OIL, WATER, AND AIR REQUIREMENTS								
Utility	Flow (steady state)	Flow (transient)	Pressure Kg/cm ² (g)	Viscosity	Heat Load	Temperature		
Lubrication Oil:								
Cooling Water:								
Casing Connections	Size	Rating			Facing		Position *	
Inlet								
Exhaust								

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TECHNICAL NOTES **(GENERAL SPECIFICATION)** **FOR** **SEAMLESS, ERW** **&** **EFSW PIPES**

	Prepared by	Checked by	Approved by
Signature			
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Date			

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1.0 GENERAL

1.1 All pipes and their dimensions, tolerances, chemical composition, physical properties, heat treatment, hydro-test and other testing and marking requirements shall conform to the latest codes and standards specified in the material description. This section contains certain additional & special requirements.

1.2 The offered pipes to various ASTM/ ASME standards shall also meet requirements of Metric unit system of relevant code e.g. ASTM A312 shall also meet requirements of ASTM A312M and ASME B36.10 shall also meet requirements of ASME B36.10M.

1.3 Testing:

1.3.1 Test reports shall be supplied for all mandatory tests as per the applicable material specification.

1.3.2 Material test certificates (physical property, chemical composition & heat treatment report) shall also be furnished for the pipes supplied. For alloy steel pipes Mill test certificate containing above information shall be furnished.

1.3.3 All C.S. pipes with wall thickness greater than 24.5 mm shall be impact tested. If welding is used in manufacture, impact test of Heat Affected Zone (HAZ) and weld material shall also be carried out. Testing shall be according to Para 323.3 of ASME B31.3.

1.3.4 Where the pipe material is specified as A312TP304/316L with suffix-RT the pipe shall be radiographed in accordance with A312 supplementary requirement S5.

1.3.5 Where the pipe material is specified as A312TP304/316L with suffix-'spot radiographed' the pipe shall be spot radiographed in accordance with requirement of ASME B31.3 para 341.5.1.

1.3.6 Pipes with a positive quality tolerance of maximum one random length shall be acceptable (no tolerance on negative side).

1.3.7 PMI test: Positive material specification to be performed at vendors works on alloy steel pipes and clad pipes. The extent of PMI examination as follows:

- 100% (for pipes procured from traders).
 - 2 random samples drawn from each size/ heat/ lot (for pipes procured directly from Mills).
- a) For welded pipes PMI shall be performed on base metal as well as weldments.

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- b) Whenever any sample drawn to PMI test on the basis of percentage selection fails to meet specification requirements, 100% of items of lot shall be tested for PMI.

1.3.8 For Hydrocarbon service, EFSW pipes confirming to ASTM A 672 shall be 100% radiograph.

1.4 Manufacturing processes:

1.4.1 Steel made by acid Bessemer process shall not be acceptable.

1.4.2 Spirally welded pipes below 24 inch shall not be acceptable.

1.5 Pipes shall be supplied in single or double random lengths of 4 to 7 and 7 to 14 meters respectively.

1.6 Welding joints:

1.6.1 Seamless and E.R.W pipes shall not have any circumferential seam joint in a random length. However, in case of E.FS.W pipe, in one random length one welded circumferential seam of same quality as longitudinal weld is permitted. This weld shall be at least 2.0 m from either end. The longitudinal seams of the two portions shall be staggered by 90° single random length in such cases shall be 5 to 7M.

1.7 Unless otherwise mentioned in the respective material code, E. FS. W /SAW pipes < 36" shall not have more than one longitudinal seam joint and E.FS.W/SAW pipes ≥ 36" shall not have more than two longitudinal seam joints.

1.8 Pipe with screwed ends shall have NPT external taper pipe threads conforming to ASME/ ANSI B1.20.1/ IS554 for 2" to 6" NB.

1.9 Pipe shall be bevelled in accordance with ANSI B16.25, except for nominal sizes NPS ≤ 1½" shall be cut square/ plain end & dimensions as per ANSI B 36.10. Weld contours shall be as follows:

Material	Wall thickness	Weld contour
Carbon steel (Except low temp. carbon steel)	Upto 22mm	Figure 2 Type A
	> 22mm	Figure 3 Type A
Alloy steel, stainless steel & low temperature carbon steel	Upto 10mm	Figure 4
	> 10mm & upto 25mm	Figure 5 Type A
	> 25mm	Figure 6 Type A

1.10 Galvanized pipes shall be coated with zinc by hot dip process conforming to ASTM A123/ IS 4736.

1.11 All austenitic stainless steel pipes shall be supplied in solution annealed condition. All types of 321 or 347 stainless steel pipes shall

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be in a stabilized heat-treated condition. Stabilizing heat treatment shall be carried out subsequent to the normal solution annealing. Soaking time & holding temperature for stabilizing heat treatment shall be 900°C & 4 hrs respectively.

- 1.12 All the seamless carbon steel pipes of size 1½” NPS and under shall be Cold-drawn/ hot finished. Carbon steel seamless pipes of size 2” & over shall be furnished hot finished. Seamless pipes cold-drawn from higher thickness pipes are not acceptable.

1.13 I.G.C Test for Stainless Steels:

- 1.13.1 For all austenitic stainless steel pipes inter-granular corrosion test shall have to be conducted as per following:

ASTM A262 Practice “B” with acceptance criteria of 60 mils/year(max.)

Or

ASTM A262 Practice “E” with acceptance criteria of “No cracks as observed from 20X Magnification” & “Microscopic structure to be observed from 250X magnification”.

- 1.13.2 When specifically asked for high temperature application for some grades of austenitic stainless steel (e.g. SS309, 310, 316, 316H etc) ASTM A262 Practice “C” with acceptance criteria of “15 mils/year (max.)” shall have to be conducted.

- 1.13.3 For the IGC test as described as above, two sets of samples shall be drawn from each solution annealing lot; one set corresponding to highest carbon content and the other set corresponding to the highest pipe thickness. When testing is conducted as per Practice ‘E’ photograph of microscopic structure shall be submitted for record.

- 1.14 All welded pipes indicated as ‘CRYO’ & ‘LT’ shall be impact tested as per requirement and acceptance criteria of ASME B31.3. The impact test temperature shall be –196C & -45C for stainless steel and carbon steel respectively unless specifically mentioned otherwise.

- 1.15 Specified heat treatment for carbon steel and alloy steel and solution annealing for stainless steel pipes shall be carried out after weld repairs. Number of weld repairs at the same spot shall be restricted to maximum two by approved repair procedure.

- 1.16 For black or galvanised pipes to IS 1239, the minimum percentage of elongation shall be 20%.

- 1.17 All 1Cr-0.5 Mo and 1.25 Cr-0.5Mo seamless pipes shall be normalized and tempered.

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- 1.18 For all weld Alloy steel pipes with mandatory requirement of heat treatment and radiography, radiography shall be performed after heat treatment.

2.0 PIPES IN HYDROGEN SERVICES:

- 2.1 All Carbon Steel pipes having wall thickness 9.53 mm (0.375") and above shall be normalized. Cold drawn pipes shall be normalized after the final cold draw pass for all thickness.
- 2.2 All alloy steel (Cr-Mo) pipes shall be normalized and tempered. The normalizing and tempering shall be a separate heating operation and not a part of the hot forming operation. The maximum room temperature tensile strength shall be 100,000 psi.
- 2.3 All carbon steel pipes having wall thickness 19 mm (0.75") and above shall be post weld heat-treated.
- 2.4 All alloy steel (Cr-Mo) pipes shall be post weld heat treated irrespective of type or thickness of weld.
- 2.5 All austenitic stainless steel grades shall be solution annealed after welding. 100% radiography of welded joints shall be done both before and after PWHT.
- 2.6 For carbon steel pipes hardness of weld and HAZ shall be 200 BHN (max.). For alloy steel pipes, hardness of weld and HAZ shall be 225 BHN (max.).
- 2.7 For all austenitic stainless steel, the weld deposit shall be checked for Ferrite Content (FN). A FN not less than 3% and not more than 10% is required to avoid sigma phase embrittlement during heat treatment. FN shall be determined by Ferrite-scope prior to post weld heat treatment (PWHT).
- 2.8 For all Carbon Steel (CS) and Alloy Steel (AS) pipes with wall thickness over 19 mm, Charpy V- notch impact testing shall be carried out in accordance with paragraph UG-84 of ASME Section VIII, Div 1 for weld metal and base metal from the thickest item per heat of material and per heat treating batch. Impact test specimen shall be in complete heat treated condition and accordance with ASTM A 370. Impact energies at 0°C shall average greater than 27 J (20 ft-lb) per set of 3 specimen, with a minimum 19 J (15 ft-lb).
- 2.9 If welding is used in manufacture, impact test of Heat Affected Zone (HAZ) and weld metal shall also be carried out.

3.0 NACE CARBON STEEL PIPES:

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- 3.1 Pipes under this category shall meet the requirements given in NACE MR-0103-2007.
- 3.2 Steel must be fully killed carbon steel type and must have been produced by Vacuum Degassing process.
- 3.3 Steel shall be calcium treated for inclusion morphology control.
- 3.4 Ultimate strength of the steel shall be limited to maximum of 80,000 PSI. The yield versus UT strength shall be limited to maximum of 0.80.
- 3.5 Carbon equivalent in all CS material shall be calculated per the formula given below.

$$CE = C + Mn/6 + (Cr + Mo + V)/5 + (Ni + Cu)/15$$

- 3.6 The longitudinal seam of welded pipes shall be subjected to 100% radiography.
- 3.7 Only following American Specifications, as specified against each product are permitted:

ASTM A 106 Gr. B/API 5L GR-B Seamless
API 5L Gr. B, SAW (LONGITUDINAL)
ASTM A 333 GR 1 & 6 SEAMLESS

- 3.8 Chemistry Control

The chemical analysis shall be carried out on heat as well as on product as per relevant product material specifications and shall meet the requirements of Table-1.

SPECIFICATION			
	ASTM A 106 Gr.B/ API 5L Gr.B (Seamless)	API5L Gr. B (SAW)	ASTM A 333 GR 1 & 6
C	0.20% max.	0.20% max.	0.20% max
S	0.02% max.	0.003% max.	0.02% max
P	0.03% max.	0.02% max.	0.025% max
Ni	0.4 % max.	0.2 % max.	-
CE	0.42 max.	0.40 max.	0.42 max

- 3.9 Mechanical tests shall be as per specified material specification.

3.10 Hardness

- 3.10.1 Maximum hardness shall be limited to 200 BHN at all places including the weldments and measurement shall be as per ASTM E-18 or ASTM E-92 respectively.

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3.10.2 Hardness test shall be conducted on a sample of each heat and on each finished product. Waiver may be given only for those products, which can get damaged due to hardness test. For small products which cannot be hardness tested individually, the manufacturer shall conduct test on a random basis by selecting components from production run or stores batches to ensure that the products complies fully with hardness requirements. The products for which hardness values are found in excess of specified value shall be rejected. If the hardness on the sample of a heat is more than the acceptable value, then the entire raw material from the heat shall be rejected.

3.10.3 For SS 316 material Moly% shall be 2.3% minimum.

4.0 IBR PIPES

4.1 Pipes under purview of IBR shall be accompanied with IBR certificate original in Form IIIA, duly approved and countersigned by IBR authority/ local authority/ manufacturer empowered by the central boiler board of India and issue inspection certificate in form-IIID. Photocopy of the original certificate duly attested by the local boiler inspector where the supplier is located is the minimum requirement for acceptance.

4.2 For materials 1¼ Cr- ½ Mo (ASTM A335 Gr. P11/ A691 Gr. 1¼ Cr) & 2¼ Cr - 1Mo (ASTM A335 Gr. P22/ A691 Gr. 2¼ Cr), Form III-A approved by IBR shall include the tabulation of E_t , S_c & S_r values for the entire temperature range given below. E_t , S_c & S_r values shall be such that throughout the temperature range

$$\begin{array}{l} E_t / 1.5 \geq \\ S_r / 1.5 \geq \\ S_c \geq \end{array} \quad \left| \quad S_A \right.$$

Where,

S_A : Allowable stress at the working metal temperature (As per latest addition of ASME B-31.3)

E_t : Yield pint (0.2% proof stress at the working metal temperature)

S_c : The average stress to produce elongation of 1%(creep) in 100000 hrs at the working metal temperature.

S_r : The average stress to produce rupture in 100000 hrs at the working metal temperature and in no case more than 1.33 times the lowest stress to produce rupture at this temperature.

4.3 For carbon steal pipes under IBR the chemical composition shall conform to the following:

Carbon (max)	:	0.25%
Others (S, P, Mn)	:	As prescribed in IBR regulation.

The chemical composition as indicated in this clause is not applicable

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for pipes other than IBR services.

4.4 No other third party inspection is required.

5.0 HYDROSTATIC TEST

- Irrespective of requirement specified in code all pipes shall be hydrostatically tested.
- The testing of A106, A333, A335, A358 & A672 shall be as per A530. A312 & A268 shall be as per A999.
- API5L shall be as per API5L.

5.1 Hydro-testing of pipes (at least one from each batch) shall be witnessed by TPI at vendor's shop. Hydro-testing of SS pipes shall be done with potable water with max. chloride content 250 ppmw (as per NACE RP-0170) where draining of test fluid is possible.

5.2 Calculation to establish hydro-test pressure shall be performed by vendor in accordance with the standards. Checking of calculation and witnessing of hydro-testing shall be performed by TPI agency.

6.0 SCOPE OF INSPECTION BY THIRD PARTY INSPECTION AGENCY

6.1 The scope of inspection shall be read with item description, codes stipulated in purchase requisition, requirement of test and inspection as per this technical specification.

6.2 Test to be witnessed:

- i) Testing for physical properties.
- ii) Visual Inspection & Dimensional check
 - a) 10% random basis for each heat. Minimum one length in case of pipe is procured from manufacture.
 - b) 100% in case the pipe is procured from stockiest/ traders.
- iii) Hydrostatic test
 - a) 10% random basis for each heat. Minimum one length in case the pipe is procured from manufacture.
 - b) 100% in case the pipe is procured from stockiest / traders.

6.3 Review of documents:

- i) Mill test certificate of raw materials.
- ii) Material identification reports.
- iii) Radiographs (if required).
- iv) Heat treatments (if required).
- v) Material composition as per NACE (if required).
- vi) Manufacturer's test certificate.
- vii) Hydro-test 100%
- viii) Supplementary test as required.

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- ix) Manufacturer's test certificates for 100% visual & dimension check in case of manufacturer.
- 6.4 Third party inspection release note shall contain the information on test witnessed, documents reviewed, observations/ remarks, identifications, order status and date(s) of inspection. The original certificate shall be furnished with supply of material.
- 6.5 Third party inspector shall stamp each length of pipe based on the same performed by the manufacturer and shall mention the same in the inspection release note. For small bore i.e. 1½" and below, stamping on the bundle of pipes instead of each length may be considered.
- 6.6 The inspection and test plan for traders and manufacturer is enclosed as Annexure-I & II.

7.0 SPECIAL REQUIREMENT

- 7.1 Applicable in case bidder is not the manufacturer of the quoted pipe.
 - 7.1.1 If trader (vendor) directly supplies the pipes, inspection at its go-down/ stockyard shall be carried out by TPI as per the requirements of this provision specified earlier & hereunder.
 - a) TPI shall check the source of pipes. The pipes must be supplied by the manufacturers, which are enlisted in the approved list of M/s. EIL and certificate in this regard issued by M/s. EIL is to be presented to TPI. TPI shall go ahead with inspection only after being satisfied with the certificate and the certificate should be the part of inspection release note issued by TPI.
 - b) Any reputed national or international inspection agency should have inspected at the works of the pipe manufacturer all those pipes that are presented to TPI for certification at trader's stockyard. TPI shall first ensure availability of original certificate, issued by the reputed national or international inspection agency in the name of first customer, and shall correlate the same with the stamp-marks that pipes shall bear.
 - c) TPI shall endorse on the original certificate, which shall form part of his inspection report. In case original certificate cannot be surrendered by trader, TPI shall endorse on a photocopy of the original certificate and enclose the same with his report.

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- d) Of each size of the finished pipe, the trader in presence of TPI shall draw one sample from each lot of 100 lengths (a lot shall consist of pipes of the same size and wall thickness and the identical heat of steel), and shall send to the TPI-approved test house for conduction of the following tests to the conformity of the relevant standard(s):
- i. Tensile test – for all MOC
 - ii. Product analysis – for all MOC
 - iii. Flattening test or bend test – for all MOC
 - iv. Hardness test – for NACE only
 - v. Impact test – for LTCS only
 - vi. IGC test – for SS only.
 - vii. PMI – for AS and SS only (carried out on every length of pipe).

In no case, however, shall the number of samples drawn for a size, having same wall thickness, be less than two.

- e) TPI shall witness/ review the test-results and endorse the certificates of the test house towards the conformity of the results to the standard.
- f) TPI shall thereafter stamp the pipes and issue inspection release note.
- g) The trader shall bear the cost for samples, tests and other incidental expenses, and shall include all such costs in the quoted rates of the pipes.
- h) The vendor shall be liable to furnish the Inspection Documents, in the specified form, along with the Dispatch Document without which the Purchaser shall not consider the material to have been delivered by the vendor. In other words, the material without proper inspection documents, shall not be considered delivered as per the interpretations of the contract, as the material cannot be used in execution even though they are physically available with the purchaser.

8.0 TECHNICAL SPECIFICATION AND SCOPE OF INSPECTION OF CLADDED PIPE

- 8.1 Acceptable method of fabrication of cladded pipe to be seamless or centrifugally cast CRA. The cladding should have metallurgical bond, mechanical bond will not be accepted.
- 8.2 Acceptable base material is A515 Gr 65 and 516 Gr 60/65/70 will be considered as equivalent.

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- 8.3 TPI to review material test certificates for chemical composition, tensile, guided bend and flattening test as per API 5LD.
- 8.4 Molybdenum in the cladding to be minimum 2.5%.
- 8.5 Diameter of the pipe to be measured and variation to be within 0.75%. TPI to review the same.
- 8.6 Minimum thickness tolerance for pipe thickness to be-12.5%.
- 8.7 Intergranular corrosion test to be carried out as per API 5LD and result reviewed by TPI.
- 8.8 Hydro-test to be done as per $S = 2\sigma/d$, limited to 3000 PSI and result to be witnessed by TPI.
- 8.9 Thickness of the cladding to be minimum 2.5mm, to be witnessed by TPI.
- 8.10 Pipe to be ultrasonically tested as per ASTM 578 level and results to be reviewed by TPI for acceptance.
- 8.11 PMI to be carried out and witnessed by TPI at least at both the ends at 180° apart.
- 8.12 Pipe to checked visually and to be free from any visible defects, scales, dents, marks etc and to be straight. TPI to witness.

9.0 MARKING & DESPATCH

- 9.1 All pipes shall be marked in accordance with the applicable codes, standards & specifications. In addition IOCL item code & special condition like “IBR”, “CRYO”, “NACE”, “H2” etc shall also be marked.
- 9.2 Pipes under “IBR”, “CRYO”, “NACE”, “H2” shall be painted in red strips, light purple brown stripes, canary yellow & sea green stripes respectively longitudinally throughout the length (25mm width) for easy identification. Marking of pipes circumferentially for sizes 1” and below at one metre interval along the length of pipes is also acceptable.
- 9.3 Paint or ink for marking shall not contain any harmful metal or metallic salts such as zinc, lead or copper which cause corrosive attack on heating.
- 9.4 Pipe shall be dry, clean and free from moisture, dirt, and loose foreign materials of any kind.
- 9.5 Pipes shall be protected from rust & corrosion.

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- 9.6 Rust preventive shall be applied. These when used on machined surfaces to be welded shall be easily removable with a petroleum solvent and the same shall not be harmful to welding.
- 9.7 Both ends of the pipe shall be protected with the following material:
- | | | |
|--------------|---|-------------------------------|
| Plain end | : | Plastic cap |
| Bevel end | : | Wood, Metal or plastic cover |
| Threaded end | : | Metal or plastic threaded cap |
- 9.8 Pipes may be provided with plastic pushfit type end caps/ steel caps without belt wire.
- 9.9 Steel end protectors to be used on galvanized pipes shall be galvanized. Plastic caps can also be used as end protectors for galvanized pipe ends.
- 9.10 All alloy materials tested by PMI shall be identified using either of the following methods by indicating "PMI OK"
- a) Bar Code/ Hologram Sticker
 - b) A low stress stamp marking

Annexure-I

		INDIAN OIL CORPORATION LTD.				INSPECTION AND TEST PLAN FOR PIPES (FOR MANUFACTURER)			SPECIFICATION		Rev.
											0
Applicable codes and specifications : ASTM/P.O Technical specification/ Pipe Specification Sheet									Scope of inspection		
Sl. No.	Stage	Component	Characteristics	Method of Check	Quantum of check	Reference Documents	Acceptance Norms	Records	Sub-Vendor	Vendor	TPI
1a	Raw material inspection	Bullet/ Mother hollow	Marking and correlation with TC	Review of records & visual	100%	Purchase requisition/ ASTM-STD/ P.O Technical Specification	Purchase requisition/ ASTM-STD/ P.O Technical Specification	Inspection report		R	
1b	Raw material inspection	Bullet/ Mother hollow	Chemical composition	Spectro	One sample per heat	Purchase requisition/ ASTM-STD/ P.O Technical Specification	Purchase requisition/ ASTM-STD/ P.O Technical Specification	Inspection report		R	
1c	Raw material inspection	Bullet/ Mother hollow	Internal soundness	Macro-etching	One sample per heat	Internal standard	Internal standard	Inspection report		R	
2	Pipe rolling heating, Hot rolling Straightening	Pipe	Process controls	As per internal QA plan	As per internal QA plan	Purchase requisition/ ASTM-STD/ P.O Technical Specification	Internal standard	Inspection report		W	
3	Heat treatment (if applicable)	Pipe	HT cycle (Time & temperature)	Furnace recorder	100%	Purchase requisition/ ASTM-STD/ P.O Technical Specification	Purchase requisition/ ASTM-STD/ P.O Technical Specification	Inspection report		W	R
4	Non destructive testing (if applicable)	Pipe	Surface & internal imperfections	UT, Eddy current, MPI or other specified	Purchase requisition/ ASTM-STD/ P.O Technical Specification	Purchase requisition/ ASTM-STD/ P.O Technical Specification	Purchase requisition/ ASTM-STD/ P.O Technical Specification	Inspection report, General record		W	R
5	Destructive testing (Note special impact hardness	Pipe	Chemical & Mechanical properties	Chemical tensile flattening bend,	Each HT lot/ each heat no/ size	Purchase requisition/ ASTM-STD/ P.O Technical	Purchase requisition/ ASTM-STD/ P.O Technical Specification	Lab report		W	H

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	requirements for H ₂ service)			hardness impact		Specification					
6	Destructive Testing (For SS materials)	Pipe	Corrosion properties	IGC test	Highest thickness & highest carbon/ HT lot	Purchase requisition/ ASTM-STD/ P.O Technical Specification	Purchase requisition/ ASTM-STD/ P.O Technical Specification	Lab report		W	H
7	Hydrotesting	Pipe	Leak check	Visual	100% vendor by random by TPI	Purchase requisition/ ASTM-STD/ P.O Technical Specification	Purchase requisition/ ASTM-STD/ P.O Technical Specification	Inspection report, Hydro-graph		W	H
8	Final inspection	Pipe	Surface condition, straightness, End finish Bevel angle, Root face. Outer dia, Thickness Length, End finish, Coating, marking Colour coding, End caps.	Visual dimensional	100%	Purchase requisition/ ASTM-STD/ P.O Technical Specification	Purchase requisition/ ASTM-STD/ P.O Technical Specification	Inspection report		W	H
9	Weight checking	Pipe	Weight	Weight scale	100%	Purchase requisition/ ASTM-STD/ P.O Technical Specification	Purchase requisition/ ASTM-STD/ P.O Technical Specification	Inspection report		W	
10	Final inspection	Pipe	PMI check	X-ray Florescence/ Spectrometer	Purchase requisition/ ASTM-STD/ P.O Technical Specification	Purchase requisition/ ASTM-STD/ P.O Technical Specification	Purchase requisition/ ASTM-STD/ P.O Technical Specification	Inspection report		W	H

Legends: H- Hold(offer for witness & obtain clearance), W- Witness, R- Review, A- Approval, I- Information, X- submit PO-Purchase order, PR- Purchase Requisition

All the NDT/ Leak testing/ Heat treatment/ Special manufacturing procedures have to be specially approved or only previously approved procedures have to be used. In case of conflict between purchase specification, contract documents and QAP more stringent conditions shall be applicable. This document describes generally the requirements pertaining to all types of pipes. Requirements specific to the item are only applicable.

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Annexure-II

		INDIAN OIL CORPORATION LTD.	Inspection and test plan for pipes (for Traders)			Specification	Rev
							0
Applicable codes and specifications: ASTM/ P.O Technical Specification/ Pipe Specification Sheet						SCOPE OF INSPECTION	
A. Review of manufacturer material test certificates and TPI certificates issued to manufacturer.							
Sl. No.	Type	Characteristics	Reference documents	Acceptance norms	Record	Trader	TPI (IOCL Representative)
1	Material testing	Chemical Composition	Purchase requisition/ ASTM-STD/P.O Technical specification	Purchase requisition/ ASTM-STD/P.O Technical specification	TPI certificates of materials at the manufacturer works	R	R & Endorse
2	Heat treatment (if applicable)	HT cycle (Time & temperature)	Purchase requisition/ ASTM-STD/P.O Technical specification	Purchase requisition/ ASTM-STD/P.O Technical specification	TPI certificates of materials at the manufacturer works	R	R & Endorse
3	Non destructive testing (if applicable)	Surface & internal imperfections	Purchase requisition/ ASTM-STD/P.O Technical specification	Purchase requisition/ ASTM-STD/P.O Technical specification	TPI certificates of materials at the manufacturer works	R	R & Endorse
4	Destructive Testing (Note special impact hardness requirements for H ₂ service	Chemical & Mechanical properties	Purchase requisition/ ASTM-STD/P.O Technical specification	Purchase requisition/ ASTM-STD/P.O Technical specification	TPI certificates of materials at the manufacturer works	R	R & Endorse
5	Destructive testing (for SS materials)	Corrosion properties	Purchase requisition/ ASTM-STD/P.O Technical specification	Purchase requisition/ ASTM-STD/P.O Technical specification	TPI certificates of materials at the manufacturer works	R	R & Endorse
6	Final inspection	Hydro-testing surface condition, dimension checking straightness, End finish. PMI check	Purchase requisition/ ASTM-STD/P.O Technical specification	Purchase requisition/ ASTM-STD/P.O Technical specification	TPI certificates of materials at the manufacturer works	R	R & Endorse

Legend: H- Hold (Offer for witness & obtain clearance), W- Witness, R- Review, A- Approval, I- Information, X- Submit, PO- Purchase Order, PR- Purchase Requisition.

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		INDIAN OIL CORPORATION LTD.		Inspection and test plan for pipes (for Traders)			Specification	Rev
								0
Applicable codes and specifications: ASTM/ P.O Technical Specification/ Pipe Specification Sheet								SCOPE OF INSPECTION
B. Review of manufacturer material test certificates and TPI certificates issued to manufacturer.								
Sl. No.	Type	Characteristics	Quantum of check	Reference documents	Acceptance norms	Record	Trader	TPI (IOCL Representative)
1	Tensile test	Mechanical properties	One sample from each lot of 100 length having same size, thickness, material & heat	Purchase Requisition/ ASTM-STD/ P.O Technical specification	Purchase requisition/ ASTM-STD/P.O Technical specification	Testing results of TPI-approved test house	W	Sample drawing-W Test results-R
2	Product Analysis	Chemical Properties	One sample from each lot of 100 length having same size, thickness, material & heat	Purchase Requisition/ ASTM-STD/ P.O Technical specification	Purchase requisition/ ASTM-STD/P.O Technical specification	Testing results of TPI-approved test house	W	Sample drawing-W Test results-R
3	Flattening test or Bend test	Mechanical properties	One sample from each lot of 100 length having same size, thickness, material & heat	Purchase Requisition/ ASTM-STD/ P.O Technical specification	Purchase requisition/ ASTM-STD/P.O Technical specification	Testing results of TPI-approved test house	W	Sample drawing-W Test results-R
4	Hardness Test	Mechanical properties	One sample from each lot of 100 length having same size, thickness, material & heat	Purchase Requisition/ ASTM-STD/ P.O Technical specification	Purchase requisition/ ASTM-STD/P.O Technical specification	Testing results of TPI-approved test house	W	Sample drawing-W Test results-R
5	Impact test – for LTCS and H2 Service	Mechanical properties	One sample from each lot of 100 length having same size, thickness, material & heat	Purchase Requisition/ ASTM-STD/ P.O Technical specification	Purchase requisition/ ASTM-STD/P.O Technical specification	Testing results of TPI-approved test house	W	Sample drawing-W Test results-R
6	IGC Test – for SS only	Corrosion Properties	One sample from each lot of 100 length having same size, thickness, material & heat	Purchase Requisition/ ASTM-STD/ P.O Technical specification	Purchase requisition/ ASTM-STD/P.O Technical specification	Testing results of TPI-approved test house	W	Sample drawing-W Test results-R

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7	Inspection - for AS & SS only	PMI Check	To be carried out on every length of pipe	Purchase Requisition/ ASTM-STD/ P.O Technical specification	Purchase requisition/ ASTM-STD/P.O Technical specification	Inspection Report	W	H
8	Final Inspection	Dimensional checking & Hydrotesting	100% for each type and size	Purchase Requisition/ ASTM-STD/ P.O Technical specification	Purchase requisition/ ASTM-STD/P.O Technical specification	Inspection Report	W	H
9	TPI Clearance	Stamping & Inspection release note	100%	---	---	Inspection Report	W	H

General Notes:

1. This is an indicative inspection and test plan for pipes. However, vendor has to develop their own inspection & test plan that will includes all the above and special requirement specific to the pipes, if any, and submit the same for approval after P.O placement.

All the NDT/ Leak testing/ Heat treatment/ Special manufacturing procedures have to be specially approved or only previously approved procedures have to be used. In case of conflict between purchase specification, contract documents and QAP more stringent conditions shall be applicable. This document describes generally the requirements pertaining to all types of pipes. Requirements specific to the item are only applicable.

TECHNICAL NOTES **(GENERAL SPECIFICATION)** **FOR** **BUTT WELDED, SOCKET** **WELDED AND SCREWED** **FITTINGS**

	Prepared by	Checked by	Approved by
Signature			
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Date			

TECHNICAL NOTES FOR BUTT WELDED, SOCKET WELDED AND SCREWED FITTINGS

1.0 GENERAL

- 1.1 Chemical composition, physical properties, tests, dimensions and tolerances, heat treatment and marking shall conform to the applicable latest codes / standards / specifications as specified. For any special requirement please refer material requisition sheet.
- 1.2 The offered fittings to various ASTM standards shall also meet requirements of Metric unit system of relevant code e.g. ASTM A234 shall also meet requirements of ASTM A234M.
- 1.3 Nipples made of seamless pipes of corresponding metallurgy shall also be acceptable as alternative to forged nipples.
- 1.4 Dimensions of all Butt Weld Fittings shall be maintained per the requirements of ANSI B 16.9/ ANSI B 16.28 latest edition. Dimensions of steel BW fittings for sizes not covered in ANSI B16.9/ ANSI B16.28 shall confirm to MSS-SP-48. The Butt Weld ends shall be prepared and finished in line with the requirements of ANSI B 16.25. Socket weld and threads for screwed fittings shall be in accordance with ANSI B16.11 and ANSI B1.20.1 respectively, unless otherwise specified.
- 1.5 All the Reducers, seamless as well as welded, concentric as well as eccentric, shall have knuckles and straight flanges at both the ends. Straight cone type reducers shall not be acceptable.

2.0 TESTING

- 2.1.1 Test reports shall be supplied for all mandatory tests as per the material specifications/ applicable code/ standards. Test reports shall also be furnished for any supplementary tests as specified. Material test certificates (physical properties, chemical composition & heat treatment report) shall also be furnished for fittings supplied. For alloy steel fittings Mill test certificate containing above information shall be furnished.
- 2.1.2 PMI test : Positive material identification test to be performed at vendors works on alloy steel fittings/ stainless steel and clad fittings. The extent of PMI examination will be 100%.
 - a) For welded fittings PMI shall be performed on base metal as well as weldments.
 - b) Whenever any sample drawn to PMI test on the basis of percentage selection fails to meet specification requirements, 100% of items of lot shall be tested for PMI.

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- 2.2 All fittings shall be seamless in construction unless otherwise specified. If fittings are specified as welded, the same shall conform to clause 1.8. Seamless fittings are acceptable in place of welded fittings, however, welded fittings are not acceptable in place of seamless fittings.
- 2.3 Outside diameters and wall thickness (unless otherwise mentioned) of butt welded fittings shall be in accordance with ASME B36.10 and ASME B36.19 as applicable.
- 2.4 For reducing butt weld fittings having different wall thicknesses at each end, the greater wall thickness of the fitting shall be employed and inside bore at each end shall be matched with the specified inside diameter.
- 2.5 Beveled ends for all fittings shall conform to ASME B16.25. Contour of bevel shall be as follows:

Material	Wall Thickness	Weld Contour
Carbon steel (except low temperature carbon steel)	Upto 22 mm	Figure 2 Type A
	> 22 mm	Figure 3 Type A
Alloy steel, stainless steel and low temperature carbon steel	Upto 10 mm	Figure 4
	> 10 mm & upto 25 mm	Figure 5 Type A
	> 25 mm	Figure 6 Type A

2.6 Welded Fittings

- 2.6.1 All welded fittings shall be double welded. Inside weld projection shall not exceed 1.6 mm. Welds shall be ground smooth at least 25 mm from the ends.
- 2.6.2 For fittings made out of welded pipe, the welded pipe itself shall be double welded and shall be manufactured with the addition of filler metal.
- 2.6.3 Welded tees shall not be of fabricated (stub-in) type.
- 2.6.4 All welded fittings shall be normalized & all weld joints including parent material weld shall be 100% radiographed by X-ray by fittings manufacturer.
- 2.6.5 Welded pipes employed for manufacture of fittings shall be made by automatic welding only.
- 2.6.6 Specified heat treatment for carbon steel & alloy steel fittings shall be carried out again after weld repairs.
- 2.6.7 Irrespective of the material code requirement, all welded fittings indicated in specification as "Cryo" & "LT" shall meet impact test

requirements of ASME B31.3. The impact test temperature shall be (–) 196°C & (–) 45°C for stainless steel & carbon steel respectively unless specifically mentioned otherwise in the SPECIFICATION.

2.7 Welded fittings formed out of plate

- 2.7.1 The welded fittings (elbows, tees reducers) shall be manufactured in two-half construction; each half formed out of plate, followed by longitudinal weld on sides.
- 2.7.2 Steel plates used for production of welded fittings shall be normalized and ultrasonically examined as per the relevant codes/ standards.
- 2.7.3 The supplementary requirements S1 and S2 of A234/ A420 shall be fulfilled.
- 2.7.4 All welded fittings shall have maximum negative tolerance of 0.3mm.

2.8 Stainless Steel Fittings

- 2.8.1 All austenitic stainless steel fittings shall be pickled & passivated.
- 2.8.2 All stainless steel fittings shall be supplied in solution heat-treated condition.
- 2.8.3 Solution annealing for stainless steel fittings shall be carried out again after weld repairs.
- 2.8.4 For all stainless steel fittings Inter Granular Corrosion (IGC) test shall have to be conducted as per the following:

ASTM A262 Practice “B” with acceptance criteria of “60” mils/year (max.)”.

Or

ASTM A262 Practice “E” with acceptance criteria of “no cracks as observed from 20X magnification” & “microscopic structure to be observed from 250X magnification”.
- 2.8.5 When specifically asked for in specification for high temperature application of some grades of austenitic stainless steel (e.g. SS309, 310, 316, 316H etc.) ASTM A262 Practice “C” with acceptance criteria of “15 mils/year” shall have to be conducted.
- 2.8.6 For the IGC test as described in clauses as above, two sets of samples shall be drawn from each solution treatment lot, one set corresponding to the highest carbon content and other set to the highest fitting thickness. When testing is conducted as per ASTM A262 Practice “E”, photograph of microscopic structure shall be submitted for record.

- 2.9 Thickness/ schedule lower or higher than specified for the finished product shall not be accepted.

For manufacturing of elbows from pipes, same size of pipe as that of elbow shall be used and the normal wall thickness of the starting pipes shall have positive tolerance only. However, where the manufacturer has an established automatic/ semi-automatic process for the manufacturer of elbows, the starting pipe may be permitted to be of lower size with higher schedule as required. Starting pipe of higher size than that of the elbow shall not be permitted.

- 2.10 The gasket contact surfaces of stub ends shall be flat with face finish specified in the requisition. Interpretation on the specified face finish is as follows:

125 AARH : Serrations with 125 to 250 μ in AARH

- 2.11 Seamless stub ends shall not have any welds on the body. Stub ends shall be of long pattern type unless specified otherwise in the specification.
- 2.12 Galvanized fittings shall be coated with zinc by hot dip process conforming to ASTM A123 / IS4736. It is to be noted that ASTM A123 refers to ASTM 153 for galvanizing of threaded components. Hence, threaded galvanized fittings shall be coated with zinc by hot dip process conforming to ASTM A153.
- 2.13 Threaded ends shall have NPT taper threads in accordance with ASME/ ANSI B1.20.1 upto 1.5" NB & IS 554 from 2" to 6" NB.
- 2.14 Unless and otherwise specified in the specification, all socket welded and screwed fittings shall be in accordance with ASME B16.11 and ANSI B1.20.1 to the extent covered in the specification except for unions which shall be in accordance with MSS-SP-83.
- 2.15 Special fittings like nipplet, elbowlet, latrolet, bosset, sweep-o-let etc. which are not covered in ASME, MSS-SP standards shall be as per manufacturer's std. Contour of these fittings shall meet the requirements of ASME B31.3. Manufacturer shall submit drawings/ catalogues of these items along with the offer.
- 2.16 All swages shall be of seamless construction.
- 2.17 Nipplet length shall be 165 mm unless specified otherwise in the specification.
- 2.18 Length of all long half couplings shall be 100 mm unless otherwise specified in the SPECIFICATION.

- 2.19 All seamless & welded pipes employed for manufacturing of fittings shall be required to have undergone hydrotest. The testing of A53, A106, A333, A335, A358 and A672 shall be as per A530. A312, A268 as per A999. API5L shall be as per API5L. ASTM B series pipes e.g. B165, B167 shall be as per respective ASTM standard IS 3589, IS 1239 and others shall be as per respective IS Standards.
- 2.20 The bevel ends of all butt weld fittings shall undergo 100% MP/ DP test.
- 2.21 Abbreviations for ends of swages and nipples shall be as follows:
- | | | |
|-----|---|--------------------|
| PBE | : | Plain Both Ends |
| TBE | : | Threaded Both Ends |
| TOE | : | Threaded One End |
| TSE | : | Threaded Small End |
| TLE | : | Threaded Large End |
- 2.22 All types of SS321, SS347 or SS348 fittings shall be in stabilized heat treated condition. Stabilizing heat treatment shall be carried out subsequent to normal solution annealing. Soaking temperature and holding time for stabilizing heat treatment shall be 900°C and 4 hours respectively.

3.0 Hydrogen Service Fittings:

- a) All carbon steel fittings having wall thickness 9.53 mm (0.375") and above shall be normalized. Cold drawn fittings shall be normalized after the final cold draw pass for all thicknesses. In addition, fittings made from forgings shall have Carbon-0.35% max. and Silicon-0.35% max. The normalizing heat treatment shall be a separate heating operation and not a part of the hot forming operation.
- b) All alloy steel (Cr-Mo) fittings shall be normalized and tempered. The normalizing and tempering shall be a separate heating operation and not a part of the hot forming operation. The maximum room temperature tensile strength shall be 100,000 psi.
- c) All carbon steel fittings having wall thickness 19 mm (0.75") and above shall be post weld heat-treated.
- d) All alloy steel (Cr-Mo) fittings shall be post weld heat treated irrespective of type or thickness of weld.
- e) All austenitic stainless steel grades shall be solution annealed after welding. 100% radiography of welded joints shall be done both before and after PWHT.

- f) For carbon steel fittings, hardness of weld and HAZ shall be 200 BHN (max.) for alloy steel fittings, hardness of weld and HAZ shall be 225 BHN (max.).
 - g) For all austenitic stainless steels, the weld deposit shall be checked for ferrite content. A Ferrite No. (FN) not less than 3% and not more than 10% is required to avoid sigma phase embrittlement during heat treatment. FN shall be determined by Ferritescope prior to post weld heat treatment.
 - h) For all carbon steel and alloy steel fittings with wall thickness over 19 mm, Charpy-V Notch impact testing shall be carried out in accordance with paragraph UG-84 of ASME Section VIII, Div.-I for weld metal and base metal from the thickest item per heat of material and per heat treating batch. Impact test specimen shall be in complete heat treated condition and accordance with ASTM A370. Impact energies at 0°C shall average greater than 27J (20 ft-lb) per set of three specimens, with a minimum of 19J (15 ft-lb).
 - i) If welding is used in manufacture, impact test of Heat Affected Zone (HAZ) and weld metal shall also be carried out.
- 3.1 For all welded alloy steel fittings with mandatory requirements of heat treatment and radiography, radiography shall be performed after heat treatment.
 - 3.2 All 1Cr-0.5Mo & 1.25Cr-0.5Mo fittings shall be normalized and tempered. All 2.25Cr-1Mo, 5Cr-0.5Mo & 9Cr-1Mo welded fittings shall be normalized and tempered.
 - 3.3 Fitting material as per ASTM A234 Gr.WP5/WP9, wherever specified, shall be as per Clause-1, unless otherwise specified.
 - 3.4 Materials designated, as structural steel grades like IS 2062, SA 36 etc. or similar specification are not permitted for manufacture of fittings.

4.0 NACE CS FITTINGS

- 4.1 Fittings under “NACE” category shall meet the requirement of MR-01-03 and the special requirements as per purchase requisition specification.

5.0 IBR FITTINGS

- 5.1 Fittings under the purview of “IBR” (Indian Boiler Regulations) shall be accompanied with original IBR certificate in Form III-C duly approved and countersigned by IBR authority/ local authority/ manufacturer empowered by Central Boiler Board of India and issue inspection certificate. Photocopy of the original certificate duly attested by the

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local boiler inspector where the supplier is located is the minimum requirement for acceptance.

- 5.2 For materials 1¼Cr – ½Mo (ASTM A234 Gr.WP11 & ASTM A234 Gr.WP11W) & 2¼ Cr-1Mo (ASTM A234 Gr.WP22 & ASTM A234 Gr.WP22W), where fittings are manufactured from pipe, Form III-C approved by IBR shall include the tabulation of E_t , S_c & S_r values for the entire temperature range given below. E_t , S_c & S_r values shall be such that throughout the temperature range.

$$\begin{array}{lcl} E_t/1.5 & \geq & \\ S_r/1.5 & \geq & S_A \\ S_c & \geq & \end{array}$$

- S_A : Allowable stress at the working metal temperature (as per latest addition of ASME B-31.3).
 E_t : Yield point (0.2% proof stress at the working metal temperature)
 S_c : The average stress to produce elongation of 1% (creep) in 100000 hrs at the working metal temperature.
 S_r : The average stress to produce rupture in 100000 hrs at the working metal temperature and in no case more than 1.33 times the lowest stress to produce rupture at this temperature.

- 5.3 For carbon steel fittings described “IBR” chemical composition shall conform to the following:

- Carbon (max.) : 0.25%
 Others (S, P, Mn) : As prescribed in IBR regulations

The above composition is not valid for non-IBR fittings.

- 5.4 No other third party inspection is required.

6.0 INSPECTION REQUIREMENT FOR FITTINGS

- 6.1 All fittings shall be made from seamless pipes unless otherwise specified in purchase order.
- 6.2 The seamless pipes shall be verified with certificate for chemical and physical properties, hydrotest requirement (as stipulated in technical spec) issued by the manufacturer's quality control section and will be endorsed by Third Party Inspection as identification of material.
- 6.3 All fittings shall be supplied in heat-treated condition as per ASTM Standard mentioned in Purchase Order.

- 6.4 Visual inspection and dimensional checking of 100% fittings as per relevant ANSI, ASTM Standards, shall be carried out by Third Party Inspection (This includes thickness checking of 100% fittings).
- 6.5 Manufacturer shall provide the following reports as per relevant standards mentioned in the technical specifications & fittings purchase order.
- a) Chemical analysis reports.
 - b) Tensile test results.
 - c) Type of heat treatment.
 - d) Hardness Test results.
 - e) Impact test reports, radiography report, IGC test report, hydrotest (if required in the specified standard).
- 6.6 All fittings shall be stamped as per specified ASTM standard specified in purchase order.

7.0 SCOPE OF INSPECTION FOR THIRD PARTY INSPECTION AGENCY

7.1 This scope of inspection shall be read with item description, codes stipulated in purchase requisition, requirement of test and inspection as per this technical specification/ note.

7.2 Tests to be witnessed:

- i. Testing for physical properties for dia. 2" and above.
- ii. Visual inspection : 100%
- iii. Dimensional check : 100%
- iv. Thickness check : 100%
- v. Impact test, if applicable
- vi. IGC test, if applicable
- vii. Hydrostatic test (if specifically mentioned)

7.3 Review of documents:

- i. Mill T.C. of raw materials
- ii. Materials identification reports
- iii. Radiographs
- iv. Heat Treatment Charts
- v. Manufacturers test certificates
- vi. Chemical analysis reports
- vii. Tensile test results
- viii. Hardness test results

7.4 Third party inspection shall issue a release note on their letterhead giving correlation-marking details. The third party inspection shall contain the information on tests witnessed, documents reviewed, observations/ remarks, identifications, order status and date(s) of

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inspection. All the documents along with original certificate & release note shall be furnished with supplies.

8.0 MARKING AND DESPATCH

- 8.1 Each fitting shall be legibly and conspicuously stamped in accordance with MSS-SP-25 along with special condition like “IBR”, “Cryo”, “NACE” and “H₂” etc.
- 8.2 Steel die marking with round bottom punch may be permitted on body of butt weld CS and lower alloy steel fittings, but for SS & higher alloy steel fittings, the same should be marked by electro-etching only.
- 8.3 Paint or ink for marking shall not contain any harmful metals or metal salts such as Zinc, Lead or Copper which causes corrosive attack on heating.
- 8.4 Fittings shall be dry, clean and free of moisture, dirt and loose foreign materials of any kind.
- 8.5 Fittings shall be protected from rust, corrosion and mechanical damage during transportation, shipment and storage.
- 8.6 Rust preventive shall be applied. These when used on machined surfaces to be welded shall be easily removable with a petroleum solvent and the same shall not be harmful to welding.
- 8.7 Fittings under “IBR”, “Cryo”, “NACE” and “H₂” shall be painted in red, light purple, canary yellow and sea green stripes respectively for easy identification. Width of stripe shall be 25mm.
- 8.8 Each end of fitting shall be protected with a wood, metal or plastic cover/ sponge.
- 8.9 Each size of fitting shall be supplied in separate packaging marked with the purchase order number, item code number, material specification, size and schedule/ thickness/ rating. For small quantities, fittings of different sizes may be packed in separate packings size-wise and these packings may be packed in a bigger package/ container clearly identifying the contents.
- 8.10 All alloy materials tested by PMI shall be identified using either of the following methods by indicating “PMI OK”
 - a) Bar Code/ Hologram Sticker
 - b) A low stress stamp marking
 - c) Or by any other method

TECHNICAL NOTES **(GENERAL SPECIFICATION)** **FOR** **VALVES** **(Gate, Globe, Check, Ball,** **Plug, Needle, Butterfly &** **Piston Valves)**

	Prepared by	Checked by
Signature		
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Date	18.12.13	18.12.13

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TECHNICAL SPECIFICATION FOR VALVES

1.0 GENERAL

- 1.1 Vendor shall quote in strict accordance with the valves data/ specification sheets, subject technical notes and all other enclosures to the requisition. Any deviation to be highlighted clearly.
- 1.2 Vendor shall supply valves along with auxiliaries, if any, such as gear operator, bypasses, drains etc. wherever specified in the specification sheets, subject notes and other enclosures to the requisition.
- 1.3 All applicable codes and standards for manufacture, testing, inspection etc. shall be of latest editions.
- 1.4 All cast valves though specified as per various BS standards shall also meet pressure temperature conditions of respective class as per ASME B16.34 and vendor shall certify the same.
- 1.5 The offered valves to various ASTM/ ASME standards shall also meet requirements of Metric unit system of relevant code e.g. ASTM A105 shall also meet requirements of ASTM A105M.

2.0 DOCUMENTATION

- 2.1 Vendor shall submit the following with the offer:
 - 2.1.1 Detailed dimensional, cross section drawing with parts/ material lists, weight etc. for the gate, ball, plug, butterfly valves, diaphragm valves, check valves & valves to manufacturer's standard.
 - 2.1.2 One copy of Valve datasheet signed as accepted by the manufacturer with all deviations marked clearly, if taken.
 - 2.1.3 Drawings for valves with accessories like gear operator/ hydraulic/ pneumatic operator, extension bonnet; extended stems with stands bypass etc. giving major salient dimensions.
- 2.2 Vendor shall submit the following documents along with dispatch documents. :
 - 2.2.1 Test reports shall be supplied for all mandatory tests as per the applicable code. Test reports shall also be furnished for any supplementary tests.
 - 2.2.2 Material test certificates (physical property, chemical composition & heat treatment report) of the pressure containing parts shall be furnished for the valves supplied. Material test certificates for the other parts shall also be furnished for verification during inspection. For alloy

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steel valves mill test certification containing above information shall be furnished.

NDT test reports, PMI & any additional test as applicable.

3.0 DESIGN & CONSTRUCTION

3.1 Valve shall be designed, manufactured, tested, inspected and marked as per the manufacturing standards; design codes and standards (latest editions) indicated in the respective valve specification sheets.

3.2 Face to face and end to end dimension of steel valves of sizes up to 24" shall conform to ASME B16.10 to the extent covered under standard.

3.3 All flanged valves shall have flanges integral (except forged valves) with the valve body. Forged valves with flanged connection will be supplied by welding flanges along with nipple with 100% radiography/ DP/ MP whichever is applicable. Flange face finish shall be normally specified in the valve specification sheet as serrated finish, 125 AARH etc. The interpretation for range of face finish shall be as follows:

Stock Finish : 1000 μ in AARH max.
Serrated Finish / Smooth : Serrations with 125 to 250 μ in AARH
Finish / 125 AARH
Extra Smooth Finish / 63 : 32 TO 63 μ in AARH
AARH

3.4 PMI test: Positive material identification test to be performed at vendor's works on pressure containing parts i.e. body & bonnet / cover of alloy steel, stainless steel valves. However for stainless steel valves PMI test is to be performed on stem also. The extent of PMI examination will be 100%.

3.5 For all weld end valves with bevel ends as per ASME B 16.25, the contour of bevel shall be as follows:

Materials	Wall thickness	Weld contour
Carbon steel [except low temp carbon steel]	up to 22 mm	Fig 2 type A
	> 22 mm	Fig 3 type A
Alloy steel, SS & low temp carbon steel	up to 10 mm	Fig 4
	> 10 mm to 25 mm	Fig 5 type A
	> 25 mm	Fig 6 type A

Inside contour shall be sloped to in line with ANSI B16.25 i.e. when the thickness is greater than that of matching pipe.

- 3.6 For flanged valves with ring joint flange the hardness shall be as follows:

Flange material	Min. Hardness of Groove (BHN)
Carbon Steel	140
1% Cr to 5% Cr	150
Type 304, 316, 321, 347	160
Type 304L, 316L	140

- 3.7 Following requirements for check valves shall be met over and above the valve spec sheet requirements:

- 3.7.1 Unless specified otherwise in the data sheet all swing check valves 3" & above shall have a drain boss at location "G" (0.5" size for valve sizes 3" & 4" and 0.75" size for valves 6" & larger) (Refer Fig.No.1 of ASME B16.34). A tapped drain hole (except in CRYO valves and 900#, 1500# & 2500# rating valves where tapping shall not be done in boss) with plug shall be provided as per ASME B16.34. Threads shall be as per ASME B1.20.1 (Taper) NPT.
- 3.7.2 Swing check valves shall be provided with limit stops to prevent disc from remaining in open position.

Wherever check valve disc assembly is supported from the cover of the check valves the following shall be ascertained:

- i. Positive location/ positioning of cover must be provided to ensure correct alignment of the valve disc.
 - ii. Hinge pin design must permit accurate alignment of the disc and valve seat.
- 3.7.3 The check valves having disc assembly supported from the cover of the check valves are not acceptable.
- 3.7.4 For heavy check valves, provisions shall be available for lifting by way of lugs, eye bolts and other such standard devices.
- 3.8 If an overlay weld-deposit is used for the body seat ring seating surface, the corrosion resistance of the seat ring base material shall be at least equal to the corrosion resistance of the material of the shell. However, provision given in valve data sheet will supersede in case of any contradiction.

- 3.9 By-pass:**
For gate valves:

ANSI Class	Size
150 Class	26 inch and above
300 class	16 inch and above

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600 class	6 inch and above
900 class	4 inch and above
1500 class	4 inch and above
2500 class	3 inch and above

By-pass valve shall be globe valve. The sizes shall be :

On main valve < 4" or = 4" = ½" or more
>4" but <10" = ¾" or more
= 10" or >10" = 1" or more

- 3.9.1 Vendor shall supply the bypass valve duly tested and fitted to the main valve. Valves with bypass shall have the direction of flow marked on the main valve. Bypass attachment to the main valve body shall not be screwed. All fillet welds for bypass installation shall be 100% examined by DP/MP test.
- 3.9.2 The bypass piping arrangement shall be such that clearance between main valve body & bypass assembly shall be the minimum possible for layout reasons. Basic design of bypass shall be to MSS-SP-45 & ASME B16.34.
- 3.10 Valve body/ bonnet shall be forged/ cast as specified. Forgings are acceptable in place of casting but not vice versa.
- 3.11 Material of construction of yoke shall be minimum equivalent to body/ bonnet material.
- 3.12 Stem shall be forged or machined from forged/ rolled bar. No casting is permitted. However, integral stem of cast stainless steel ball valves is acceptable.
- 3.13 Butt welding and socket welding carbon steel valves shall have 0.25% maximum carbon content, free machining steel is not acceptable.
- 3.14 The valve packing shall meet type testing for fugitive emission as per API 622.
- 3.15 All Teflon packing, seats, seals, lining etc. shall be virgin Teflon-Top grade.
- 3.16 All forged chrome moly valves shall be furnished in normalized and tempered condition in accordance with ASTM A182.
- 3.17 Stellite/ hard-facing by deposition, shall be minimum 1.6mm. Finished thickness after final machine condition. In case of renewable seat rings the same shall be seal welded for valves of size 3" and above to prevent loosening in service.

3.18 For all Austenitic stainless steel valves, Inter Granular Corrosion (IGC) test shall have to be conducted as per following:

3.18.1 ASTM A 262 practice "B" with acceptance criteria of 60 mils/ year (max.) for all materials forged, rolled, wrought and casting.

Or

ASTM A262 practice "E" with acceptance criteria of "No cracks as observed from 20X magnification" for all materials other than castings. "Microscopic structure to be observed from 250X magnification" in addition.

3.18.1 When specifically asked for in MR for high temperature application of some grades of austenitic stainless steel (e.g. SS309, 310, 316, 316H etc.) ASTM A 262 practice "C" with acceptance criteria of '15 mils/ year (max)" shall be conducted.

3.18.2 For the IGC test as described in Clause as above two sets of samples shall be drawn from each solution annealing lot. One set shall correspond to the highest carbon content and the other to the highest pressure rating. When testing is conducted as per practice "E", photograph of the microscopic structure shall be submitted for record.

3.19 All types of 321 or 347 stainless steel valves shall be in a stabilized heat treated condition. Stabilising heat treatment shall be carried out subsequent to the normal solution annealing. Soaking temperature and holding time for stabilizing heat treatment shall be 900 C and 4 hours respectively.

3.20 Spiral wound bonnet gaskets are to be provided with inner/ outer ring except when encapsulated gaskets type body-bonnet joints are employed. In case of non-circular gasket used in 150# valve, the same will be either corrugated metal laminated with flexible graphite or tanged gasket with SS-316 inserts.

3.21 Body bonnet joint is to be design to ASME SECTION-VIII DIV-1 APPENDIX-2.

3.22 In case of gate valve, stem to gate connection shall be accommodated within Gate only.

3.23 Wear travel mentioned in API 600 has to be maintained and recordrd.

3.24 In case of gear operated globe valve, stem will be non rotating type and guides are to be provided to minimize wear & to maintain stem movement aligned in all valve orientations.

3.25 Ball/ Plug/ Butterfly Valves:

3.25.1 As a pre qualification fire safe test as per API-607/ API 6FA/ BS 6755 Part II shall be carried on all kinds of ball (soft seated or metal seated), plug, butterfly valves and also on lubricated plug valves. The test shall

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be witnessed & certified by third party inspection agency. The vendor has to submit test certificate for the particular design / type of the valve offered.

3.25.2 The operating levers or handles on ball valves shall indicate, by their position, whether the valve is open or closed. The open position shall be indicated when the lever or handle points in a direction parallel to the flow through the valve. In addition, it shall be impossible to reverse the indicating position inadvertently during reassembly of the valve.

3.25.3 Ball and plug valve shall be drilled to relieve pressure from plug port area to upstream of valve when valve is closed.

3.25.4 Each valve shall be supplied with a lever/wrench except for gear operated/motor operated valves.

3.25.5 All ball valves (soft seated or metal seated) shall be supplied with antistatic device.

3.25.6 Soft-seated BW/ SW end ball valves shall have a 100 mm long seamless pipe nipple (compatible to body material) welded to each end of the valve. Nipples are to be welded prior to assembling Teflon seats/seals. Schedule of nipple shall be indicated in the valve specification sheet.

3.25.7 Face to face dimension of all ball valves shall be same as those of the corresponding ANSI class of gate valves (except 10 inch onwards in class 150 where the face-to-face dimensions shall be as per API 6D long pattern).

3.25.8 The ball shall be solid and shall not protrude outside the end of flanges of the valves.

3.25.9 The ball valve shall be floating ball type/trunion mounted as per following:

Rating	Size	Type
150 #	8" & below	Floating ball
	10" & above	Trunion mounted
300 #	4" & below	Floating ball
	6" and above	Trunion mounted
600 # and above	1.5" & below	Floating ball
	2" & above	Trunion mounted

3.25.10 Unless otherwise specified in the data sheets, bore of all reduced bore ball valves shall be limited to one size lower than the nominal bore. If not specified in the data sheet the ball valve shall be supplied with full bore.

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3.25.11 Butterfly valves if specified/used in other than cooling water lines (Cat.'D' services) shall be high performance fire safe design to API-609.

3.25.12 Unless otherwise specifies, plug valve shall be pressure balance type.

3.25.13 Whenever the term STELLITE' is mentioned it mean facing of Seat and Disc or Wedge by Cobalt- Chromium-Tungsten alloy. Stelliting should be able to maintain hardness of 375 BHN at high temperatures. Whenever the term' HARD' is mentioned with reference to Seat or Disc of valve, it should be 350-500 BHN (min).

3.26 The MOVs are to be installed in an open area and the actuators shall be suitable for all weather conditions. The testing of complete assemblies of MOVs along with the actuators shall be done by the supplier at his works.

3.27 Ends of flanged valve of 22" size shall match corresponding flanges to MSS-SP44 unless otherwise specified.

4.0 OPERATION

4.1 Generally the valves are hand wheel or lever operated. Gear operation shall be provided as under:

VALVE TYPE	CLASS	SIZE REQUIRING GEAR-OFFER
Gate valve, globe valve	150 class	12" and larger
	300 class	10" and larger
	600 class	8" and larger
	900 class	6" and larger
	1500 class	3" and larger
	2500 class	3" and larger
Ball/ plug Valve (other than pressure balance plug valve)	150 class	6" and larger
	300 class	6" and larger
	600 class	4" and larger
	900 class	3" and larger
	1500 class	3" and larger
Butterfly Valve	150 class	10" and larger
	300 class	6" and larger

For sizes lower than these ranges, hand wheel/ lever/ wrench shall be provided.

For pressure balance plug valves the gear operator shall be as per manufacturers recommendation. For sizes lower than these ranges, hand wheel/ lever/ wrench shall be provided.

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- 4.2 Gear operator shall be as under, with position indicators for open/ close positions, with limit stops (limit stops are not applicable for gate and globe valves)

For gate/ globe/ diaphragm valves	Totally enclosed bevel gear in grease case with grease nipples/ plugs.
For ball/ plug/ butterfly valves	Totally enclosed helical worm or combination of helical and spur gear in grease case with grease nipples/ plugs.

- 4.3 Where gear operator is not called for as above but vendor recommends a gear operator, he shall highlight such case (s).
- 4.4 Gear operator shall be so designed to operate effectively with the differential pressure across the closed valve equal to the cold non-shock pressure rating.
- 4.5 Ball, plug and butterfly valves even with wrench or lever operators shall have “open” position indicators with limit stops.
- 4.6 Hand wheel diameter shall not exceed 750 mm and lever length shall not exceed 500mm on both sides. Effort for normal operation shall not exceed 35 kgs at hand wheel periphery but for opening & or closing, the effort shall be as per EN 12570 Clause 5.1. However failing to meet the above requirements vendor shall offer gear-operated valve and quote as above.

5.0 IBR CERTIFICATION

- 5.1 For valve described “IBR”, valves shall be in accordance with the latest IBR (Indian Boiler Regulation) including the requirements specified in the specification.
- 5.2 For SW / BW end carbon steel valves under IBR, the chemical composition shall conform to the following:

Carbon (max.)	:	0.25%
Others (S, P, Mn)	:	as per IBR regulations

The above composition is not valid for non-IBR valves.

- 5.3 Valves coming under the purview of “IBR” (Indian Boiler Regulations) shall each be individually accompanied by IBR certificate original in Form III-C duly approved by IBR authority/ local authority empowered by the central boiler board of India. Photocopy of original certificate

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duly attested by the local boiler inspector where the supplier is located is the minimum requirement for acceptance.

6.0 SPECIAL REQUIREMENT FOR VALVES IN HYDROGEN SERVICES:

6.1 GENERAL

- 6.1.1 All cast valve flanges & bodies with flange rating of Class 900 or greater shall be examined in accordance with paragraphs 7.2 through 7.5 of Appendix-VII of ASME SEC-VIII, DIV.1, regardless of casting quality factor.
- 6.1.2 All casting for body/bonnet shall be 100% radio-graphed irrespective of pressure, temperature, class & rating.
- 6.1.3 All Weld repairs shall be subjected to PWHT.
- 6.1.4 Body/bonnet/cover joints and stuffing box of all valves shall have low emission. One valve per metallurgy, per rating, per size shall be helium leak tested as per ASME Sec. V, Subsection A, Article 10 (Detector/Tracer Probe Technique), Appendix V at a minimum of 25% of the allowable (rated) cold working pressure. Selection of valves for helium leak test shall be at random. Test duration shall be as follows:

Test Duration in Minutes					
Normal size	Pressure Class				
	Upto 300	600	800&900	1500	2500
Upto 2"	3	6	9	12	12
3" to 6"	6	9	12	15	18
8" to 16"	9	9	12	15	18
18" to 24"	9	12	15	18	21

The valve shall show no leakage. No leakage is defined as a total leakage rate of less than **0.0001 ml/s of helium**.

- 6.1.5 Only normalized and tempered material shall be used in the following specifications:

Castings : A217 Gr. WC1, A217 Gr. WC4, A217 Gr. WC5, A217 Gr. WC6, A217 Gr. WC9, A217 Gr.C5, A217 Gr.C12

Forgings : A182 Gr. F11 Cl.2

6.2 CS & AS VALVES

- 6.2.1 Bend test and magnetic particle inspection of the entire surface of body and bonnet casting shall be in accordance with ASTM A 217. Supplementary requirement S3 & S4 evaluation of magnetic particle, inspection shall be in accordance with ANSI B16.34/ MSS-SP-53 **except that no linear discontinuities shall be allowed.**
- 6.2.2 The Brinell hardness of heat-treated casting shall not exceed 200 BHN for carbon steel & 225 for alloy steel.
- 6.2.3 Repair to defective casting shall be outlined in writing to the purchase before repair starts. Repair method to be approved prior to welding.
- 6.2.4 Casting shall be preheated to a minimum of 400 degree F prior to welding and all Chromium Molybdenum alloys shall be post weld heat treated after welding is complete. Stress relieving is essential for welds.
- 6.2.5 Carbon steel shall be normalized and alloy steels shall be normalized and tempered.
- 6.2.6 Dye Penetrant Test of welds shall be in accordance with ASTM B165 Procedure B-2. Interpretation as per Appendix-8 of ASME-VIII Div.1.
- 6.2.7 The tensile stress for AS shall be less than 100,000 PSI.
- 6.2.8 Charpy V-notch impact testing is to be done for valve material (average 20 ft-lb for set of 3 [minimum value 15 ft-lb] at 30°F) to be ensured.
- 6.2.9 For radiography and acceptance criteria for valve casting, clause no. 6.3.2 will be applicable.

6.3 SS VALVES

- 6.3.1 Valve casting shall be in solution heat treated and pickled condition.
- 6.3.2 Critical body and bonnet casing section typically defined by ASME B16.34 shall be radiographed and shall meet ASTM E446 (upto 2" thick) Category A, B & CA Level 2, Category CB, OC & CD Level 3, Category D, B & F Level 0. For wall thickness 2" to 4.5" comparable plates of ASTM E186 shall be used. ASTM E94 and ASTM E142 shall be used for recommended practice & controlling quality of radiography as guide. The entire surface of all castings shall be dye penetrant inspected after picking.
- 6.3.3 Welds shall be 100% radiographed and evaluated in accordance with paragraph 344.5 of ASME B31.3 with a minimum casting quality factor of 0.95. Dye penetration test shall be as per ASTM E165 Procedure B-2, interpretation as per Appendix-8 of ASME-VIII Div.1.

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7.0 VALVES IN NACE SERVICE

- 7.1 Valves under this category shall meet the requirements given in NACE MR-0103-2007 and the special requirements as per material requisition by the respective refineries.

8.0 LOW TEMPERATURE & CRYOGENIC VALVES

8.1 Scope

All valves of Low Temperature Carbon Steel (LTCS) and all grades of austenitic SS (CRYO) material are categorized as cryogenic valves. All these valves shall have extended bonnet as per BS 6364 except check valves. Valves shall be suitable for installation in position (on vertical, horizontal or skewed pipeline).

8.2 Qualification Criteria

Both cryogenic test and reference list together, as indicated herein, shall be considered for vendor qualification and vendor shall furnish the same, along with his offer of particular type / rating of valves. Cryogenic test certificates of Higher size of valves w.r.t MR submitted by the vendors, also qualifies the valves of lower size of valves.

Vendors whose current supply does not cover valves of all sizes, materials and ratings (cryogenic test and reference list) required by specification, should confirm/ furnish the following for consideration of their offer:

1. Evidence of having conducted successfully at least one cryogenic test as per BS 6364. Test certificate and reference list shall be furnished with the offer.
2. Vendor shall confirm to conduct cryogenic test as per clause 8.2.1 for the remaining valves not later than 12 weeks from the date of purchase order.

Offers of vendors who do not comply with above requirement would be rejected.

Cryogenic test need not to be conducted for every order. Test conducted previously of particular type/rating is acceptable but test certificates of particular type / rating to be furnished along with the offer. Also, IRN should include the reviewing of cryogenic test certificates by the third party inspection agency.

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8.2.1 Cryogenic Test:

Vendors to furnish copies of cryogenic test certificate for tests conducted as per details given below:

1. Shall be as per BS 6364.
2. Test temperature, unless specifically called for otherwise in the individual MR, shall be -45°C for LTCS and -196°C for all grades of austenitic stainless steel.
3. Tests carried out on a particular size of one type of valve, pressure rating and material shall qualify all sizes equal to and below the test valve size for the same type, pressure rating and material. In case of austenitic SS any one grade would qualify for all other grades of austenitic SS.
4. Tests shall have to be witnessed and certified by any one of the approved third party inspection agencies.

8.2.2 Reference List:

Vendor shall furnish reference list for valves supplied for cryogenic service indicating the name of client, year of supply, size, material, pressure rating, type of valve and quantity.

8.2.3 Post Order Testing Procedure:

1. Before conducting post order testing, vendor shall submit the following for approval.
 - a) Test procedure (as per BS 6364).
 - b) Cross-section drawing of the valve with material of construction.
 - c) Schematic of test rig (as per BS 6364) with complete details.
2. Test has to be conducted on largest size of order for each type of valve and for each material and class rating. Vendor shall offer one, two or three valves for selection of test valve by inspector depending upon whether quantity of largest valve in the order is one, two or three and more than three respectively.

In the event of failure of the test valve to meet the specification requirements, the vendor shall conduct test on two more valves. If the other two valves which pass test successfully, are of lower size, then the qualification will be valid only to sizes upto which test has been conducted successfully.

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3. In case of non-conductance of cryogenic test(s) within 12 weeks or failure in the test(s) conducted after receipt of order, the owner reserves the right to invoke any of the provisions of the purchase order including cancellation of the purchase order at the risk and cost of vendor.
- 8.3 Bonnet extension, wherever specified in the valve sheet to BS 6364 shall be for “non cold box application” unless otherwise specified in the MR. Even if not called for in valve sheet, valves indicated as “LT” or “CRYO” shall be supplied with bonnet extension.
- 8.4 Bonnet and Gland extension joints shall be of butt welded construction.
- 8.5 Repair welding procedure for austenitic stainless steel valves in “CRYO” service shall have to be qualified for impact test as per ASME B31.3. Minimum acceptable impact energy shall be 20J or lateral expansion of 0.38 mm at temperature of (-) 196°C.
- 8.6 Wherever impact test of CS studs/ nuts is called for in the data sheet, the impact value shall be 27J at the intended service temperature specified in the data sheets.
- 8.7 Repair welding procedure for low temperature carbon steel valves in “LT” service shall have to be qualified for impact test as per ASME B31.3.

9.0 SCOPE OF INSPECTION & TESTING OF TPI

Every valve shall be subjected to all the mandatory tests and checks called in the respective codes/ data sheets by TPI/ IBR agency.

9.1 Forged Valves

1. Visual and dimensional inspection.
2. Review of material test certificates.
3. Any mandatory or supplementary test.
4. Hydrostatic test on 10% valves selected on random basis.
5. Strip check is required for 1% of total order quantity of valves of each type, class & material of construction of body & bonnet irrespective of sizes (sample selection will be generally in highest sizes in the lot) in similar category. **However, strip check is not required for CS/ Brass/ Bronze material valves with 13% Cr/ Brass/ Bronze trims.**

9.2 Cast steel valves

1. Visual and dimensional inspection.
2. Review of material test certificates.

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3. Review of radiographs/ radiographic reports or any other NDT tests wherever applicable as per data sheet.
4. Any mandatory or supplementary test.
5. Hydrostatic test 100% for body, 10% other test.
6. Strip check is required for 1% of total order quantity of valves of each type, class & material of construction of body & bonnet irrespective of sizes (sample selection will be generally in highest sizes in the lot) in similar category. **However, strip check is not required for CS/ Brass/ Bronze material valves with 13% Cr/ Brass/ Bronze trims.**

9.3 In case of motor operated or actuator-operated valves, functional/ operational checks as per the requirements of the specifications shall be made on each valve.

9.4 **Third party inspection is also required for IBR valves which will be prior to IBR inspection, the TPI will verify the documents and dimensional check-up.**

10.0 RADIOGRAPHY OF CAST VALVES:

10.1 Valve castings shall undergo radiographic examination as specified in individual valve material spec sheet. Radiography specified as random 10% or 20% etc. in the respective **valve data sheet** implies 10% or 20% etc. of number of valves ordered against each item number with a minimum of one valve against each item.

Material	Rating	Size range	Radiography
All	150#	24" and below	NIL**
		26" and above*	100%
	300#	16" and below	NIL**
		18" and above*	100%
	600# & above	All sizes	100%

* No radiography is required for valves of size 26" in cooling water service (A3A).

**** For sizes 24" & below in 150# and 16" & below in 300#, radiography percentage if specifically mentioned in individual valve material spec sheet shall govern.**

10.2 Radiography procedure, areas of casting to be radiographed shall be as per ASME B16.34 and acceptance criteria shall be as per ASME B16.34 Annexure-B. However for areas of casting to be radiographed for types of valves not covered in ASME B16.34, vendor shall enclose details of areas to be radiographed in the line with ASME B16.34.

10.3 For random radiography wherever specified in individual data sheets, the sampling shall be per size of the quantity ordered for each foundry.

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- 10.4 Radiography wherever specified in the data sheets or as above shall be done by X-ray/ γ -ray to get the required sensitivity.
- 10.5 Over and above the stipulations laid down above all valve castings when sourced indigenously shall only be procured from approved & reputed foundries.

11.0 MARKING

- 11.1 Valve markings, symbols, abbreviations etc. shall be in accordance with MSS-SP-25 or the standard referred in specification sheet as applicable. Vendors name, valve rating, material designation, nominal size, direction of flow (if any) etc. shall be integral on the body.
- 11.2 Each valve shall have a corrosion resistant tag giving size, valve tag/ code no, securely attached on the valve body.
- 11.3 Paint or ink for marking shall not contain any harmful metal or metal salts such as zinc, lead or copper which causes corrosive attack on heating.
- 11.4 Carbon steel/ Alloy steel valves shall be painted with one coat of inorganic zinc silicate (minimum DFT 65 to 75 microns).
- 11.5 All alloy steel high temperature valves shall be painted with heat resistant silicone paint suitable for intended temperature.
- 11.6 All 3½ Ni steel/ LTCS valves shall be painted with one coat of inorganic zinc silicate coating.
- 11.7 Non –IBR CS valves shall be painted with two coats of Aluminum paint.
- 11.8 IBR valves shall be painted with two coats of Red paint in body bonnet/ body cover joint.
- 11.9 NACE valves shall be painted in yellow colour (synthetic enamel) in body bonnet/ body cover joint.

12.0 DESPATCH

- 12.1 After inspection valves shall be dry, clean and free from moisture, dirt and loose foreign material of any kind.
- 12.2 Valves shall be protected from rust, corrosion and any mechanical damage during transportation, shipment and storage.
- 12.3 Rust preventive on machined surfaces to be welded shall be easily removable with petroleum solvent or which shall not be harmful to welding.

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12.4 Each end of valves shall be protected with the following materials:

Flange Face	:	Wood, Metal or Plastic cover
Beveled End	:	Wood, Metal or Plastic cover
SW & SCRD End	:	Plastic Cap

12.5 For special service valve additional requirement (if any) of dispatch shall also be met.

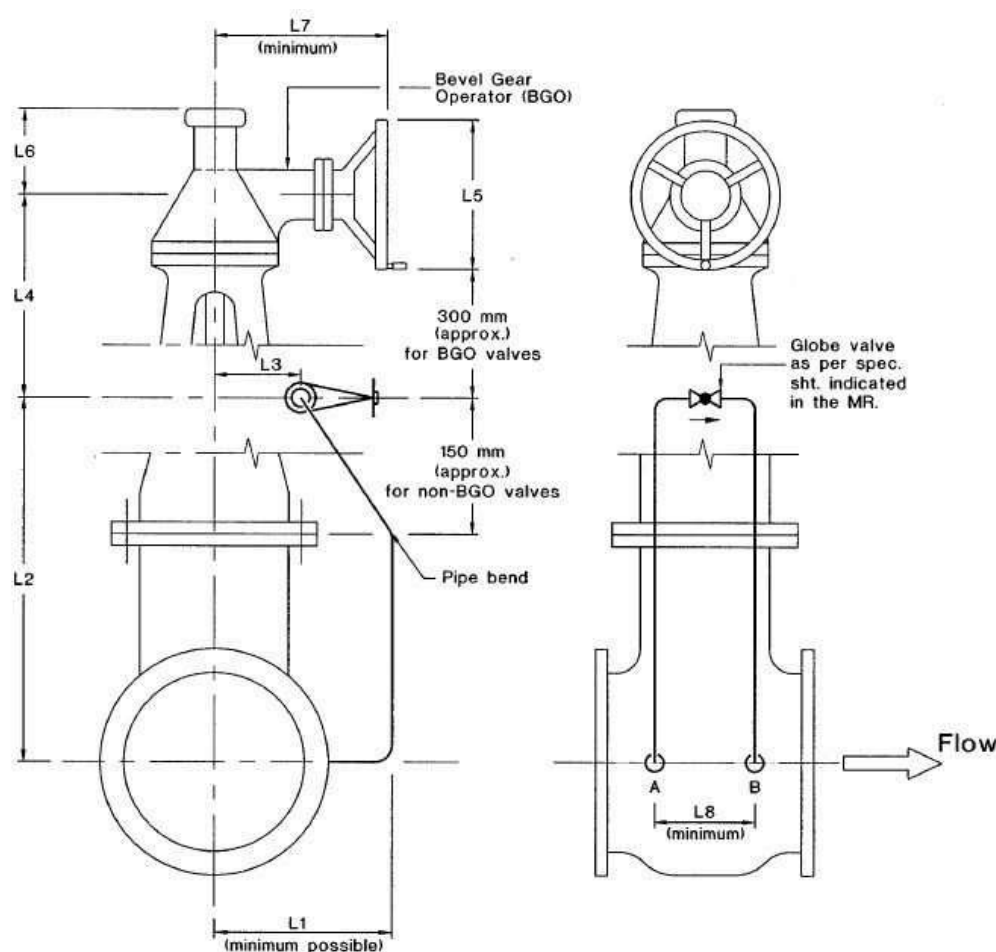
12.6 End protectors of wood/ plastic to be used on flange faces shall be attached by at least three bolts and shall not be smaller than the outside diameter of the flange. However, plastic caps for SW & SCRD end valves shall be press fit type.

12.7 End protectors to be used on beveled end shall be securely and tightly attached.

12.8 All alloy materials tested by PMI shall be identified using either of the following methods by indicating "PMI OK"

- a) Bar Code/ Hologram Sticker
- b) A low stress stamp marking
- c) Any other method

BYPASS PIPING ARRANGEMENT



NOTES:

1. The orientation & location of hand wheel of bevel gear operator & the bypass arrangement shall be strictly as per this sketch.
2. The bypass pipe ends shall be socket/ butt welded to the body wall of the main valve.
3. The bypass arrangement shall be properly clamped to & supported by the body of the main valve.
4. Basic design of bypass shall be to MSS-SP-45 & ASME B16.34.
5. The by-pass piping, fittings and valve shall be of compatible material and design w.r.t. requirement of piping classes wherein the by-pass is used. In case of pipe bend used for bypass piping, higher schedule pipe is to be used for the same and in case forged elbow, traceability of the same is to be ensured to clause no. 3.1 of EN 10204.
6. This sketch is applicable for both BGO & NON-BGO Valves.
7. Vendor shall furnish dimensions L1 to L8.

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INSPECTION AND TEST PLAN FOR VALVES

INSPECTION & TEST PLAN FOR VALVES

1.0 SCOPE

This Inspection and Test Plan covers the minimum testing requirements of Valves.

2.0 Reference Documents

PO/ PR/ Standards referred therein/ Job specifications/ Approved documents.

3.0 INSPECTION AND TEST REQUIREMENTS

SL. NO.	STAGE/ ACTIVITY	CHARACTERISTICS	QUANTUM OF CHECK	RECORD	SCOPE OF INSPECTION		
					SUB SUPPLIER	SUPPLIER	EIL/ TPIA
1.0	Procedure						
1.1	Hydrostatic Test, Heat Treatment, NDT, Helium Leak Test and Other Procedures	Documented Procedures	100%	Procedure Documents	-	H	R
1.2	WPS, PQR & WPQ	Welding Parameters & Qualification Record	100%	WPS, PQR & WPQ	-	H	W-New R-Existing
1.3	Pre-Qualification Tests	Fire safe, Cryogenic & Other Test as applicable	As per PR/ Purchase Specification	Acceptance Report	-	H	H (If New)
2.0	Material Inspection						

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SL. NO.	STAGE/ ACTIVITY	CHARACTERISTICS	QUANTUM OF CHECK	RECORD	SCOPE OF INSPECTION		
					SUB SUPPLIER	SUPPLIER	EIL/ TPIA
2.1	Castings & Forgings (Body, Bonnet, Disc, Stem, Body Ring)	Chemical, Mechanical, Heat Treatment, NDT, IGC & Other Properties as applicable	100%	Test Certificate	H	R	R
2.2	Castings & Forgings (Body, Bonnet, Disc, Stem, Body Ring)	Visual & Dimension	100%	Inspection Report	H	H	-
2.3	Body and Bonnet Castings	Radiography Examination	As per PR/ Purchase Specification	Films and report	H	R	R
2.4	Bars for Trim material	Chemical Analysis	Each Heat	Test Certificates & Lab Report	H	R	-
2.5	Gaskets, Gear units, Fasteners, Gland, Packings, etc.	Physical/ Chemical Properties	100%	Test Certificates & Lab Report	H	R	-
2.6	Actuators as applicable	Performance, Statutory as applicable	100%	Test Certificates, Inspection Report	H	H	R
3.0	In Process Inspection						
3.1	Welding	Welding Parameters	100%	Inspection	-	H	-

SL. NO.	STAGE/ ACTIVITY	CHARACTERISTICS	QUANTUM OF CHECK	RECORD	SCOPE OF INSPECTION		
					SUB SUPPLIER	SUPPLIER	EIL/ TPIA
		as per WPS/ PQR		Reports			
3.2	Machining of components	Visual/ Dimension	100%	Inspection Reports	-	H	-
4.0	Final Inspection						
4.1	Hydrostatic/ Pneumatic Test and Helium Leak test as applicable	Leak Check	As per PR/ Purchase Specification	Test Report	-	H	RW (Note-1)
4.2	Visual/ Dimension	Surface & Dimension Check	100%	Test Report	-	H	RW (Note-1)
4.3	Functional Test for Actuator Operated Valves	Satisfactory Performance	100%	Test Report	-	H	RW
4.4	PMI Check	Chemical	As per EIL Spec. 6-81-0001	Inspection Report	-	H	RW
4.5	Strip Check (As applicable)	Verify Components & Differential hardness if applicable	As per PR/ Purchase Specification	Inspection Report	-	H	RW (Note-1)
4.6	Final Stamping	Stamping Of Accepted Valves	Stamping of Valves which are witnessed by EIL/ TPIA	Inspection Report	-	H	RW (Note-1)
5.0	Painting						
5.1	Painting and Color coding as	Visual/ DFT Check	100%	Inspection Report	-	H	-

SL. NO.	STAGE/ ACTIVITY	CHARACTERISTICS	QUANTUM OF CHECK	RECORD	SCOPE OF INSPECTION		
					SUB SUPPLIER	SUPPLIER	EIL/ TPIA
	applicable						
6.0	Documentation & IC						
6.1	Documentation & Inspection Certificate (IC)	Review of Stage Inspection Reports/ Test Reports & Issue of IC	100%	Supplier TC & IC	-	H	H

Legend: H – Hold (Do not proceed without approval), P – Perform, RW – Random Witness (As specified or 10% (min. 1 no. of each size and type of Bulk item), R – Review, W – Witness (Give due notice, work may proceed after scheduled date).

NOTES (AS APPLICABLE):

1. For Non NACE & Non Hydrogen service Carbon Steel Valves up to size 12” will be accepted on review of Supplier Test Certificates. Supplier Test Certificate to be reviewed by EIL/ TPIA.
2. This document describes the generic test requirements. Any additional test or Inspection scope if specified in contract documents shall also be applicable (unless otherwise agreed upon).
3. Acceptance Norms for all the activities shall be as per PO/ PR/ Standards referred there in/ Job specification/ approved documents.

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MATHURA REFINERY
MECHANICAL MAINTENANCE
TECHNICAL SPECIFICATION

REF:
TPS/MM

December 18, 2017

Instrument Vendor List

- Orifice
 1. General Instruments
 2. Micro Precision Products
 3. Technomatic SPA
 4. Excel Hydropneumatics
 5. Baliga Lighting
- Pressure Gauges/ Differential Pressure Gauges
 1. Odin India
 2. Wika
 3. Manometer India
 4. A. N. Instruments
 5. H. Guru
 6. Forbes Marshall
 7. General Instruments Consortium
 8. Pyroelectric Goa
- Pressure / DP/Flow (DP Type)/ Level (DP type) Transmitters
 1. Emerson Process Management (Rosemount)
 2. Honeywell
 3. Yokogawa
 4. Endress& Hauser
- Pressure /Diff. Pressure Switches
 1. SOR inc.
 2. UE
 3. Custom Control Sensors, UK
 4. Ashcroft
 5. Dresser
 6. Dwyer
 7. Switzer
- Level Gauge
 1. Chemtrols
 2. Richard Klingner
 3. Technomatic, Italy
 4. Yarway
 5. Bliss Anand



MATHURA REFINERY
MECHANICAL MAINTENANCE
TECHNICAL SPECIFICATION

REF:
TPS/MM

December 18, 2017

6. R. K. Dutt concerns
7. Pratolina
8. Magnetrol
9. V. Automat

- Temperature Elements (Thermocouples/RTD)

1. General Instruments
2. Fabrika
3. Thermoelectric, international
4. AltopIndustires
5. Pyroelectric
6. A. N Instruments
7. Forbes Marshall

- Mercury in steel / Bimetallic Temperature Gauge

1. General Instruments
2. Forbes Marshall
3. A. N.Instruments
4. H. Guru
5. Pyroelectric, Goa
6. Wika

- Temperature Switches

1. UE
2. SOR
3. CCS, UK
4. Dwyer

- Control Valves (Globe/plug type)& PCV

1. Fisher Sanmar
2. Dresser Masoneilan, India
3. Instrumentation Limited, Palakkad
4. Metso Automation
5. Flowserve
6. MIL
7. Samson

- On-Off Valves (Ball type)

1. Virgo
2. Metso Automation
3. Tyco Valves (Keystone)



MATHURA REFINERY
MECHANICAL MAINTENANCE
TECHNICAL SPECIFICATION

REF:
TPS/MM

December 18, 2017

4. Flowserve

- Smart Positioners and Valve Position indicators

1. Fisher Sanmar
2. Metso Automation
3. Foxboro
4. Siemens

- Speed probe

1. GE
2. Ametek

- Solenoid Valves

1. ASCO
2. Herion

- Air Filter Regulator

1. Fairchild
2. Norgren
3. Parker-Hannifin
4. Fisher

- Limit/Proximity Switch

1. Honeywell
2. Allen Bradley (imported)
3. Cutler-Hammer (imported)

- Switches, Lamps and Push buttons

1. Allen Bradley
2. Siemens
3. GE
4. L&T
5. Teknik

- Screwed terminals

1. Wago
2. Elmex



MATHURA REFINERY
MECHANICAL MAINTENANCE
TECHNICAL SPECIFICATION

REF:
TPS/MM

December 18, 2017

3. Phoenix

- IS Barriers, Isolators, Trip amplifiers, Multiplexers
 - 1. MTL 5000 series
 - 2. P&F KFD series
- Instrument Power, Signal, Control and Temp. Cables
 - 1. Associated Cables
 - 2. UdeyPyrocables
 - 3. Brooks Cable
 - 4. Toshniwal Cables
 - 5. Thermopads
 - 6. Universal Cables
 - 7. Finolex Cables
- Junction Box, Local Push Button Stations, Cable Glands
 - 1. Flexpro
 - 2. Exprotecta
 - 3. FCG Flameproof Control gears
 - 4. Baliga Lighting
- Tube Fittings
 - 1. Swagelok
 - 2. Parker



MATHURA REFINERY
MECHANICAL MAINTENANCE
TECHNICAL SPECIFICATION

REF:
TPS/MM

December 18, 2017

MANDATORY SPARES FOR INSTRUMENT ITEMS

S. No.	Part Description	Quantity Required	Quoted: Yes/No/Not Applicable and with price
Mandatory spares shall be quoted and included in base price as follows:			
	FIELD INSTRUMENTS		
1.	Pressure Gauges	Two Numbers	
2.	Temperature Gauges with thermowell	Two numbers	
3.	Level Gauges	A) For transparent gauges, one set of illuminators with holder and reflector B) In case of magnetic type level gauges, displacer for each gauge to be provided in addition to above. C) One Set of glass of each type, size along with pair of Gaskets(Cushion & Wet Gaskets)	
4.	SMART Transmitters Pressure, Flow (DP), Level(DP) and Temperature	One set of each type, range, make and material of construction, whichever is higher.	
5.	Speed probe & associated local display	3 nos of speed probes & 3 nos of local display	

NOTE :

1	Above mentioned mandatory spares list defines the minimum requirement. Contractor to provide any additional items as recommended by manufacturer. Contractor to submit mandatory spares list to Owner for approval.
2	All spare items required for commissioning shall be supplied by contractor.

ALL technical data sheet of the turbine, motor ,Instrumentation items etc has to be duly filled and uploaded while quoting for the product failing which technical evaluation cannot be carried out

The Existing Lube oil scheme is attached as Annexure 2 with few of the proposed modification marked in it. The same is Proprietary property of OEM and should not be reused/replicated in any form without the consent of OEM of our turbine.

The annexure -3 is a general guideline for selection, supply of centrifugal . Mandatory spares details as mentioned in annexure -3 to be ignored

The annexure -4 is a general guideline for selection, supply of screw pumps.Mandatory spares details as mentioned in annexure -4 to be ignored

**Corporate Materials Management
BHEL New Delhi**

**AA:MM:Agency
Dt. 06.08.2010**

Guidelines regarding dealings with Indian Agents of Foreign Suppliers

1. BHEL shall deal directly with the foreign original equipment manufacturers (OEM)/ Foreign Principal, for all its purchases which are imported.
2. Wherever the foreign OEM/ principal desires to avail the services of an Indian Agent, the dealings with Indian Agents are to be regulated. The guidelines of BHEL in this regard have been drafted as per CVC circular no. 007/VGL/033 dated 04.12.2007.

Definition of Indian Agent

3. An Indian Agent of foreign principal is an individual, a partnership, an association of persons, a private or public Company, that carries out specific obligation(s) towards processing of BHEL tender or finalization or execution of BHEL's contract on behalf of the foreign supplier.

Recommendations

4. All NITs shall have the following terms regarding Indian agents of foreign principals:
 - i. BHEL shall deal directly with foreign vendors, wherever required, for procurement of goods. However, if the foreign principal desires to avail of the services of an Indian agent, then the foreign principal should ensure compliance to regulatory guidelines - which require mandatory submission of an Agency Agreement.
 - ii. It shall be incumbent on the Indian agent and the foreign principal to adhere to the relevant guidelines of Government of India, issued from time to time.
 - iii. The Agency Agreement should specify the precise relationship between the foreign OEM / foreign principal and their Indian agent and their mutual interest in the business. All services to be rendered by agent/ associate, whether of general nature or in relation to the particular contract, must be clearly stated by the foreign supplier/ Indian agent. Any payment, which the agent or associate receives in India or abroad from the OEM, whether as commission or as a general retainer fee should be brought on record in the Agreement and be made explicit in order to ensure compliance to laws of the country.
 - iv. Any agency commission to be paid by BHEL to the Indian agent shall be in Indian currency only.
 - v. Tax deduction at source is applicable to the agency commission paid to the Indian agent as per the prevailing rules.
 - vi. In the absence of any agency agreement, BHEL shall not deal with any Indian agent (authorized representatives / associate / consultant, or by whatever name called) and shall deal directly with the foreign principal only for all correspondence and business purposes.
 - vii. The "Guidelines for Indian Agents of Foreign Suppliers" enclosed at annexure –'A' shall apply in all such cases.

- viii. The supply and execution of the Purchase Order (including indigenous supplies/ service) shall be in the scope of the OEM/ foreign principal. The OEM/ foreign principal should submit their offer inclusive of all indigenous supplies/ services and evaluation will be based on 'total cost to BHEL'. In case OEM/ foreign principal recommends placement of order(s) towards indigenous portion of supplies/ services on Indian supplier(s)/ agent on their behalf, the credentials/ capacity/ capability of the Indian supplier(s)/ agent to make the supplies/ services shall be checked by BHEL as per the extant guidelines of Supplier Evaluation, Approval & Review Procedure (SEARP), before opening of price bids. In this regard, details may be checked as per Annexure-B (copy enclosed). It will be the responsibility of the OEM/ foreign principal to get acquainted with the evaluation requirements of Indian supplier/ agent as per SEARP available on www.bhel.com.

The responsibility for successful execution of the contract (including indigenous supplies/ services) lies with the OEM/ foreign principal. All bank guarantees to this effect shall be in the scope of the OEM/ foreign principal.

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Guidelines for Indian Agents of Foreign Suppliers

- 1.0 There shall be compulsory registration of agents for all Global (Open) Tender and Limited Tender. An agent who is not registered with BHEL shall apply for registration in the registration form in line with SEARP.
- 1.1 Registered agents will file an authenticated Photostat copy duly attested by a Notary Public/Original certificate of the Principal confirming the agency agreement and giving the status being enjoyed by the agent and the commission/ remuneration/ salary/ retainership being paid by the principal to the agent before the placement of order by BHEL.
- 1.2 Wherever the Indian representatives have communicated on behalf of their principals and the foreign parties have stated that they are not paying any commission to the Indian agents, and the Indian representative is working on the basis of salary or as retainer, a written declaration to this effect should be submitted by the party (i.e. Principal) before finalizing the order.
- 2.0 Disclosure of particulars of agents/ representatives in India, if any.**
- 2.1 Tenderers of Foreign nationality shall furnish the following details in their offers:
 - 2.1.1 The Bidder(s)/ Contractor(s) of foreign origin shall disclose the name and address of the agents/ representatives in India if any and the extent of authorization and authority given to commit the Principals. In case the agent/ representative be a foreign Company, it shall be confirmed whether it is existing Company and details of the same shall be furnished.
 - 2.1.2 The amount of commission/ remuneration included in the quoted price(s) for such agents/ representatives in India.
 - 2.1.3 Confirmation of the Tenderer that the commission/ remuneration, if any, payable to his agents/ representatives in India, may be paid by BHEL in Indian Rupees only.
- 2.2 Tenderers of Indian Nationality shall furnish the following details in their offers:
 - 2.2.1 The Bidder(s)/ Contractor(s) of Indian Nationality shall furnish the name and address of the foreign principals, if any, indicating their nationality as well as their status, i.e. whether manufacturer or agents of manufacturer holding the Letter of Authority of the Principal specifically authorizing the agent to make an offer in India in response to tender either directly or through the agents/ representatives.
 - 2.2.2 The amount of commission/ remuneration included in the price (s) quoted by the Tenderer for himself.
 - 2.2.3 Confirmation of the foreign principals of the Tenderer that the commission/ remuneration, if any, reserved for the Tenderer in the quoted price(s), may be paid by BHEL in India in equivalent Indian Rupees on satisfactory completion of the Project or supplies of Stores and Spares in case of operation items.
- 2.3 In either case, in the event of contract materializing, the terms of payment will provide for payment of the commission/ remuneration, if any payable to the agents/ representatives in India in Indian Rupees on expiry of 90 days after the discharge of the obligations under the contract.
- 2.4 Failure to furnish correct and detailed information as called for in paragraph 2.0 above will render the concerned tender liable to rejection or in the event of a contract materializing, the same liable to termination by BHEL. Besides this there would be a penalty of banning business dealings with BHEL or damage or payment of a named sum.

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Annexure-B

This format is applicable only to Indian Suppliers/ Agents supplying indigenous portion of Foreign Purchases.

* In all other cases, extant guidelines of SEARP, 2010 are to be followed.

SEARP (SRF) Clause No	Detail
	Name & address of the firm
1.0	Products/ Systems / Services being considered for
2.0	General Information
2.2	Name of Chief Executive
2.3	Details of authorized signatory
3.0	Ownership Information
3.1	Type of firm
3.2	Nature of Business • <i>Attach authorization letter and agency agreement from Principal (from whom capital equipment is procured)</i> • <i>Attach copy of declaration from Foreign Principal for total guarantee/ warranty of indigenous supplies</i>
3.3	Year of establishment
3.4	Year of commencement of business
4.0	Registration particulars
4.1	Permanent Account No.
4.2 / 4.3	Sales Tax / TIN no
4.6	Service tax no. (in case of E&C)
5.0	Organisational strength
6.0	Other particulars
6.1	If the company is already registered with other units
6.2	Directors/ Partners, if related to any BHEL Employee
6.9	If any Ex BHEL Personnel employed by the Company
6.12	Details of pending legal issues with BHEL
6.13	Bank Account information
9.0	Financial information
9.6	Sales/ Turnover details of last 3 years (or from the date of incorporation whichever is less)

---X---

(To be executed on Non- Judicial Stamp Paper for an appropriate value.
To be stamped as an agreement)

(For Suppliers on Unit's / Division's PM D)

ANNEXURE-II

Framework Confidentiality Agreement Cum Undertaking

This Agreement made on this the _____ day of (month) _____ 20 ____
("Effective Date") by and between M/s. BHARAT HEAVY ELECTRICALS LIMITED, having
registered office at "BHEL House", Siri Fort, New Delhi – 110049 (India), acting through its
_____ Unit (hereinafter may be referred to as "BHEL" or "the company").

And

M/s. _____ (address) _____
represented by authorized representative Sri _____ (herein
after referred to as the "Supplier").

The supplier and the company may, unless the context otherwise requires, hereinafter be
collectively referred to as "Parties" or singly as the "Party".

RECITALS

Whereas, BHEL is engaged in the design, engineering, manufacturing, construction, testing,
commissioning and servicing of a wide range of products, systems and services for the core
sectors of the economy, viz. Power, Transmission, Industry, Transportation, Renewable
energy, Oil & Gas and Defence and providing associated services to varied customers in
relation to which BHEL/ its affiliates own valuable information of a secret and confidential
nature.

Whereas the Company may, in connection with contract(s) (as defined hereunder) placed
or to be placed upon the supplier, or otherwise, from time to time, make available,
Technical Information as is defined hereunder.

And Whereas BHEL is willing to provide such Technical Information to the Supplier from
time to time and the Supplier understands and acknowledges that such Technical
Information is valuable for the Company and as such is willing to protect confidentiality of
such information, subject to the terms and conditions set out hereunder.

Now therefore, in view of the foregoing premises and in consideration of the mutual
covenants and agreements hereinafter set forth, the parties agree as under:

1. Definitions:

Unless the context so requires, in this Agreement, the following terms will bear the
meaning ascribed to the said term in this clause.

- A. **“Contract”** means the contract entered into with a supplier and includes a Purchase Order, or a Work Order for procurement of any goods or for provision of any services.
- B. **“Effective Date”** means the date of this Agreement as mentioned in the preamble of this Agreement.
- C. **“Supplier”** includes a Contractor or a Vendor of the Company whether for supplying of goods or for providing any services under a Contract or both.
- D. **“Technical Information”** includes Drawings, and / or Product Standards and / or Specifications and / or Corporate / Plant Specifications and / or Technological Process Sheets and / or Technical Data Sheets and / or Jigs & Fixtures and / or Pattern & Dies and / or Special Gauges and / or Tools etc. Belonging to or wherein the Company has acquired from a third party a right of user and includes any improvement thereto from time to time whether carried out by the Company or by the Suppliers.
- E. **“Intended Purpose”** means the purpose for which the Technical Information is provided to the supplier under or in connection with a contract.
- F. **“Improvement”** includes any modification made to, or adaptation of, the Technical Information which enhances or is calculated to enhance the performance (Whether in terms of effectiveness or in terms of efficiency or both) of the product and / or the service to be provided by the Supplier under a Contract.

2. This Agreement shall come into force / deemed to have come into force, as the case may be, on the Effective Date; or, on the first date when the Technical Information or any part thereof is provided by BHEL to the supplier; whichever is earlier.

3. **Agreement deemed to be incorporated in each contract:** Unless and to the extent otherwise stipulated in the Contract, the conditions of this Agreement are deemed to be incorporated in all Contracts which may be entered into between the Company and the Supplier. Further, unless otherwise stipulated, the obligations under this Agreement are and will be independent of the obligations under the Contracts and such obligations of the Supplier hereunder will remain of full effect and validity notwithstanding that the period of validity of the Contract has expired by efflux of time stipulated therein; or, the contract has been discharged by performance or breach; or, the termination of the Contracts for any reason whatsoever.

4. **Ownership:**

4.1 The Company may, from time to time, make available to the Supplier, Technical Information on a non-exclusive basis by way of loan.

4.2 The Supplier acknowledges and agrees that all Technical Information and copies thereof that are or may be provided by the Company to the Supplier, are and shall remain the property of BHEL or that of the concerned entity from whom BHEL has

obtained the Technical Information and such Technical Information are and shall constitute trade secrets of the BHEL. Nothing in this Agreement or in any disclosures made hereunder by or on behalf of the Company shall be construed as granting upon the Supplier any patent, copyright or design or any other intellectual property rights of whatsoever description that subsists or may hereinafter exist in the Technical Information. Furthermore, nothing in this Agreement or in any disclosures made hereunder by or on behalf of the Company shall be construed as granting upon the supplier any license or right of use of such patent, copyright or design or any other intellectual property rights of whatsoever description which may now or hereafter exist in the Technical Information except for use of the Technical Information strictly in accordance with this Agreement and the contract and / or as directed in writing by the Company, solely for the Intended Purpose under the Contract.

- 4.3 Neither party is obligated by or under this Agreement to purchase from or provide to the other party any service or product and that any such purchase / sale of any product and / or service by one party to the other party will be governed by the Contract if any, that may be entered into by and between the Company and the Supplier.
- 4.4 The Supplier is / has been made well aware and acknowledges that the Technical Information being / which may be shared with it by the Company has been either generated by the Company by incurring huge investment and cost or obtained from foreign collaborators under Technical Collaboration Agreement (TCA) with stringent confidentiality conditions.
- 4.5 The supplier agrees and undertakes to adhere to confidentiality requirements as applicable to BHEL under a TCA and also ensure that the confidentiality requirements are adhered to by all its concerned employees or sub-contractors /suppliers (where permitted to be engaged by BHEL). Any damages, losses, expenses of any description whatsoever, arising out of or in connection with a breach of the confidentiality requirements under a TCA owing to any act or omission on the part of the supplier or its employees or sub-contractors / suppliers that is claimed by a foreign collaborator from the Company shall be wholly borne by the Supplier and it shall keep BHEL fully indemnified in this behalf. The demand by the Company shall be conclusive upon the Supplier who shall thereupon forthwith pay to the Company without demur, dispute or delay the amount as demanded without demanding any further proof thereof.
- 4.6 The Supplier agrees and undertakes that unless so decided and advised by the Company in writing all rights / title to any Improvement to the Technical Information shall vest in the Company. The Supplier undertakes and agrees to inform forthwith to the Company of any such Improvement made to the Technical Information and transfer all drawings / documents or other materials connected with such Improvement to the Company and

also agrees to fully cooperate with the Company for protecting the Company's interests in such Improvements in the Technical Information including but not limited to obtaining necessary protection for the intellectual property rights in such improvement, if so desired by the Company. If a question arises whether a modification amounts to improvement to the Technical Information, the same shall be decided by the Company and such decision shall be final and binding upon the supplier.

5. Use and Non – Disclosure:

5.1 Unless otherwise stipulated by the Company, all Technical Information made available to the supplier, by the Company shall be treated as Confidential irrespective of whether the same is marked or otherwise denoted to be Confidential or not.

5.2 The Supplier undertakes and agrees that the Technical Information in its possession shall be held in strict confidence and will be used strictly in accordance with this Agreement and solely for the Intended Purpose under the Contract. Use of the Technical Information for any other purpose other than Intended Purpose is prohibited.

5.3 In particular, the Supplier shall not use Technical Information or any Improvement in its possession for the manufacture or procurement of the product(s) or components or parts thereof or use the Technical Information or any portion thereof or any modification or adaptation thereof in any form to provide any product and / or service to any third party, without the prior written consent of the Company.

5.4 The Supplier shall not disclose any of such Technical Information to any third party without the prior written consent of the Company. The Supplier agrees that without prior written consent of the Company, the supplier shall not disclose to a third party about the existence of this Agreement, or of the fact that it is / was in possession of or has experience in the use of any Technical Information nor shall the Supplier share in any manner whatsoever, with a third party, the name or details of any Contract(s) awarded by the Company to it or performed by the Supplier or the scope of work thereof or share any document or correspondence by and between the Company and the supplier in or in connection with this Agreement or such Contract(s). Notwithstanding what is stated elsewhere, the overall responsibility of any breach of the confidentiality provisions under this Agreement shall rest with the Supplier.

5.5 This Supplier undertakes and agrees not to make copies or extracts of and not to disclose to other any or all of the Technical Information in its possession, except as follows:

- (a) The Supplier may disclose the Technical Information to such of its officers and employees strictly to the extent as is necessary for such officer or employee for the Intended Purpose, provided that the Confidential Information (or copies thereof) disclosed shall be marked clearly as the confidential and proprietary information of Company and that such officers and employees shall similarly be bound by undertakings of confidence, restricted use and non-disclosure in respect of the Technical Information. The Supplier shall be responsible for any breach of such confidentiality provisions by such officers and employees.
- (b) With the prior written consent of Company, the supplier may disclose for the Intended Purpose such Technical Information as is provided for in such consent to such of its professional advisers: consultants, insurers and subcontractors who shall be similarly bound by undertakings of confidence, restricted use and non-disclosure in respect of such Technical Information.
- (c) The Supplier shall not be prevented to make any disclosure required by (i) order of a court of competent jurisdiction or (ii) any competent regulatory authority or agency where such disclosure is required by law, provided that where the supplier intends to make such disclosure, it shall first consult Company and take all reasonable steps requested by it to minimize the extent of the Technical Information disclosed and to make such disclosure in confidence and also shall cooperate with the Company in seeking any protective order or any other remedy from proper authority in this matter.

6. Exceptions:

The Obligations of the Supplier pursuant to the provisions of this agreement shall not apply to any Confidential Information that:

- a) was / is known to, or in the possession of the Supplier prior to disclosure thereof by the Company;
- b) is or becomes publicly known, otherwise than as a result of a breach of this agreement by the Supplier.
- c) is developed independently of the Disclosing party by the Supplier in circumstances that do not amount to a breach of the provisions of this Agreement or the Contract;
- d) is received from a third party in circumstances that do not result in a breach of the provisions of this Agreement.

- 7. The Obligation of maintaining confidentiality of the Technical Information on each occasion, shall subsist for the entire duration during which the Technical Information / equipment is in possession of the Supplier and shall thereafter subsist for a further period of _____ years from the date when the complete Technical Information has been returned in portions on different dates, the period of ____ years will be reckoned from the date when the last portion of the Technical Information has been returned.

Notwithstanding the expiry of the confidentiality obligation, the obligation of the Supplier under clause 5.4 shall continue to subsist for a further period of _____ years.

8. Warranties & Undertakings:

- a) The Supplier undertakes to ensure the due observance of the undertakings of confidence, restricted use and non-disclosure by its persons to whom it discloses or releases copies or extracts of the Technical Information.
- b) The Supplier shall keep the Technical Information or improvement made therein properly segregated and not mix up the same with any other material / documents belonging to him / it or to any other third party.
- c) The Supplier further undertakes that he / it shall not hypothecate or give on lease or otherwise alienate or do away with any of the Technical Information and / or equipment of the Company, made available to him / it, and undertakes that he / it shall hold the same as a trustee, in capacity of custodian thereof and use / utilise the same solely for the purpose of executing the contract awarded by the Company.
- d) The Supplier further undertakes that he / it shall return all the equipment and / or Technical Information as far as practicable in the same condition in which the same was made available to him / it by the Company together with any Improvement thereon and the documents connected with such Improvement, to the Company forthwith upon completion of the scope of work or contract for which such Technical Information was provided by the Company to it or as directed by the Company together with a confirmation by way of an affidavit or in such manner as directed by the Company that it has not retained any equipment and / or Technical Information / improvement thereof. In case any such equipment and / or Technical Information or thereof shall remain in his possession or is not capable of being returned, the retention and use of such Technical Information or improvement thereto shall continue to be governed by this Agreement.
- e) The Supplier undertakes to indemnify the Company for all the direct, indirect and / or consequential losses, damages, expenses whatsoever including any consequential loss of business, profits suffered by the Company owing to breach by the Supplier of its obligations under this Agreement and / or the confidentiality requirements, if any, contained in the Contract and that the Supplier hereby agrees that the decision of the Company in all such or any such matter/s shall be final and binding on the Supplier. On mere written demand of the Company, the Supplier shall forthwith and without demur or delay pay to the Company any such sum as determined by the Company as the amount of loss or damage or expense which has been suffered by the Company. The

Supplier agrees that the Company shall be entitled to withhold and appropriate any amount payable to the Supplier under any Contract then existing between the Company and the Supplier, in case the Supplier fails to make payment, in terms of the written demand, within 7 days thereof. Without prejudice to the forgoing actions, in respect to any breach of this Agreement, the Company shall be entitled to take any other action against the Supplier as per applicable laws, the Contract, Company's applicable policies, guidelines rules, procedures, etc.

9. Without prejudice to any other mode of recovery as may be available to the Company for recovery of the amount determined as due as per Clause 9 (f) hereinabove, the Company shall have a right to withhold, recovery and appropriate the amount due towards such losses, damages, expenses, from any amount due to the Supplier in respect of any other Contract (s) placed on him / it by any department / office / unit/ division of the said Company.

10. Arbitration & Conciliation:

1. Except as provided elsewhere in this contract, in case amicable settlement is not reached between the parties, in respect of any dispute or difference; arising out of the formation, breach, termination, validity or execution of the contract; or, the respective rights and liabilities of the parties; or, in relation to interpretation of any provision of the contract; or, in any manner touching upon the contract, then, either party may, by a notice in writing to the other party refer such dispute or difference to the sole arbitration of an arbitrator appointed by head of the BHEL unit issuing the contract.

The Arbitrator shall pass a reasoned award and the award of the Arbitrator shall be final and binding upon the parties.

Subject as aforesaid, the provisions of Arbitration and Conciliation Act 1996 (India) or statutory modifications or re-enactments thereof and the rules made thereunder and for the time being in force shall apply to the arbitration proceedings under this clause, the seat of arbitration shall be at Hyderabad.

The cost of arbitration shall be borne as per the award of the Arbitrator.

Subject to the arbitration in terms of clause 55, the courts at Sangareddy, Telangana State shall have exclusive jurisdiction over any matter arising out of or in connection with this contract.

Notwithstanding the existence or any dispute or differences and / or reference for the arbitration, the contractor shall proceed with and continue without hindrance the performance of its obligations under this contract with due diligence and expedition in a professional manner except where the contract has been terminated by either party in terms of this contract.

In case of contract with Public Sector Enterprise (PSE) or a Government Department, the following shall be applicable:

In the event of any dispute or difference relating to the interpretation and application of the provisions of the contract, such dispute or difference shall be referred by either party for arbitration to the sole arbitrator in the Department of Public Enterprises to be

nominated by the secretary to the Government of India in—charge of the Department of Public Enterprises. The Arbitration and Conciliation Act, 1996 shall not be applicable to arbitration under this clause. The award of the arbitrator shall be binding upon the parties to the dispute, provided, however, any party aggrieved by such award may make further reference for setting aside or revision of the award to the Law Secretary, Department of Legal Affairs, Ministry of Law and justice, Government of India. Upon such reference the dispute shall be decided by the Law secretary or the special Secretary or Additional secretary when so authorized by the Law secretary, whose decision shall bind the parties hereto finally and conclusively. The parties to the dispute will share equally the cost of arbitration as intimated by the arbitrator.

2. INTEREST CLAUSE:

In order to bring uniformity in all the contracts / agreements entered between BHEL and its contractors / vendors / suppliers / service providers etc., it is hereby advised to incorporate the following clause in all tenders and agreements.

“No interest shall be payable by BHEL on earnest money or security deposit or any money due to the contractor by BHEL.”

11. Governing Law & Jurisdiction:

This agreement shall be construed and interpreted in accordance with the laws of India and shall have exclusive jurisdiction of Sangareddy/Hyderabad courts, Telangana, India.

SIGNATURE

WITNESSES

1

Name:

Address:

2

Name:

Address:

Annexure - III

Proforma for self-certification by Supplier for minimum local content on their letter head for order value less than Rs 10 Crore

"We _____ (Name of Manufacturer) undertake that we meet the mandatory minimum Local Content (LC) requirement i.e. _____ (to be filled as notified in the policy) for claiming Purchase Preference linked with Local Contents under the Govt. policy against tender no. _____."

Auditor's certification with respect to minimum local content on the letter head of Statutory Auditor for order value above Rs.10 crore

"We _____ the statutory auditor of M/s _____ (name of the bidder) hereby certify that M/s _____ (name of manufacturer) meet the mandatory Local Content requirements of the Goods and/or Services i.e. _____ (to be filled as notified in the policy) quoted vide offer No. _____ dated _____ against BHEL's tender No. _____ by M/s _____ (Name of the bidder)."

(Attachment to Enquiry No. E6A1T86687 Due on Date 25.01.2020 for submission by 11.00 hrs to open from 14.00 hrs.)			
INSTRUCTIONS TO BIDDER (ITB)			
NOTE: Bidder to confirm in affirmative by typing "YES" or "Applicable Data" in the response column. Deviations , if any shall be recorded in deviations/comments column (Separate sheet can be attached if needed). Non deviatable clauses are indicated as "NON DEVIATABLE".			
Sl. No.	DETAILED TERMS & CONDITIONS	VENDOR RESPONSE (YES/NO)	DEVIATIONS / COMMENT
1	SCOPE OF SUPPLY:		
	Signed & Sealed offers are invited for the Scope of Supply of goods and Services or both as detailed in the enquiry. Relevant enclosures/supporting documents / catalogue, if any shall be enclosed to the technical offer. Bidder can also submit offer through email at their own risk. The offer is to be submitted in two parts. Technical offer to be submitted to mail ID technicalbid_hyd@bhel.in , and price bid to be submitted to mail ID pricebid_hyd@bhel.in as an attachment only. Interchanging the information in the mails may lead to rejection of the offer. Supplier shall have no claim on e-mail offers sent on any other e-mail ID. In case of e-mail offers, the mail subject should contain Enquiry No. Due date and Supplier name, Supplier address including contact details shall be mentioned in the content of the mail. Without these details offer is liable for rejection.		
2	GENERAL INSTRUCTIONS:		
A	The quotation should be neatly typed and free from over writing/ erasures. Any correction or addition must be authenticated. The offer including annexures and brochures should be submitted in English / Hindi. All Pages of Techno Commercial Bids (Main Pages), ITB should be signed and Stamped. If there is a conflict in case of bilingual submission, the submission in English will be final.		Non Deviatable
B	In case of Single-Part bid Tender, the complete bid shall be submitted in a single sealed cover super subscribing the Tender number and due date. Incomplete offers are liable for rejection. E mail bids shall be sent to mail ID pricebid_hyd@bhel.in as an attachment only.		Non Deviatable
C	Bidders to please note that the Terms & conditions contained in this document and Special conditions, if any, are to be read fully before submission of quotations.		Non Deviatable
D	BHEL reserves the right to process the tender through Reverse Auction (RA) route. Bidders are requested to go through RA guidelines (which are attached) and confirm acceptance of the same. Otherwise the offer is liable for rejection. BHEL will decide (after technical bid opening), at its discretion, to process the tender through Reverse Auction or by opening price bids.		Non Deviatable
E	Vendors are advised to comply with specific conditions of the enquiry, Should there be any deviations (where deviations are permitted), it shall be entered in the deviation column. BHEL reserves the right to reject such offers or load the bid suitably for evaluation.		Non Deviatable
F	Offers shall be submitted directly, only by the vendor or by their authorized representative / agent and the offer should be in line with the regulatory guidelines (i.e A valid Agency agreement between principal vendor and agent / representative shall be attached and the agreement shall cover the scope of services rendered by Agent, Agency Commission and any other information called for as per the regulatory guidelines). OEM / Mill details shall be provided if supplier is not a manufacturer. Bid envelops shall bear the name of Supplier. In case of submission through authorized representative/agent, the name of representative/agent should also be mentioned apart from supplier name.		Non Deviatable
G	Offer received after the specified time and date of submission shall be rejected. No further correspondence shall be entertained.		Non Deviatable
H	Unsolicited offers shall not be considered.		Non Deviatable
3	OTHER PARTICULARS (Please indicate applicable data)		
A	Name of the Bid currency (freely tradable foreign currency for imports and Indian Rupees for indigenous purchase).		
B	Name of the Port of loading and Port of Discharge (applicable to imports).		
4	BID SUBMISSION PROCEDURE:		
A.	For Single Part Bids: Offers addressed to DGM/CMM, Vendor Complex, BHEL, Hyderabad must be sent in a sealed cover on which tender enquiry number and the due date shall be super subscribed and sent by appropriate mode to above address or dropped in tender box located at vendor complex on or before the specified time and date of submission of offers, preferably in the bidder's envelope. For e-mail offers please follow the procedure mentioned in 2 (B).		Non Deviatable
B.	For two-Part Bids:		

i	Two part bid consisting of i)Techno-commercial Bid - (Part-I), with all technical specification & scope including bill of material etc., EMD (where applicable) and unpriced bid with all applicable Commercial Terms and Conditions, rates of agency commission , duties, taxes and other charges, <u>except</u> ii) <u>the price,</u> super scribing enquiry No. (Techno-Commercial Bid) and due date Signed and Stamped ITB and special conditions of contract, if any is required to be attached along with Techno-commercial Bid - (Part-1) AND iii)Price Bid (Part-II), containing ONLY the price (including agency commission, if any) and the applicable duties/taxes/other charges shall be kept in a separate sealed cover super subscribing Enquiry no. (Price bid) & due date. Both these covers shall be kept in a Third cover super subscribing Enquiry no. & due date. All techno commercial terms & conditions mutually agreed prior to price bid opening shall prevail and supersede any terms and conditions specified otherwise in price bid.		Non Deviatable
ii	Techno-commercial Bid will be opened on the assigned date .Only the price bids of vendors whose techno commercial bids are accepted will be opened later on a specified date. In case BHEL opts for Reverse Auction, the date of conducting RA will be intimated separately to all the qualified bidders.		Non Deviatable
iii	The bidders whose bids are techno commercially not accepted will be informed & EMD (Earnest Money Deposit) shall be returned wherever submitted.		
iv	Bidders will be allowed to submit the impact on their quoted prices due to changes in technical scope, specifications, and commercial terms/conditions as specified in NIT which in the opinion of BHEL warrant changes in prices.		Non Deviatable
v	Bids shall be opened on due time and date in the presence of bidders who may like to be present. Only one representative of each bidder shall be permitted to attend the bid opening.		Non Deviatable
5	Delivery Instructions		
A	Indigenous Purchase		
	Goods shall be delivered on FOR Destination basis to the named destination(s) or as specified in the enquiry, Insurance in the scope of supplier.		
B.	Imports		
	The goods shall be delivered on CIP-basis to port of discharge as mentioned in the purchase order.		
6	Documentation:		
A	Indigenous Purchase		
	Seller shall arrange to send to BHEL, Hyderabad along with all the required documents as detailed in Purchase Order, such as, Tax Invoice (Original for Recipient, Duplicate for Transporter), consignee copy of LR, Packing list , Pre-dispatch Inspection report, Test/ Guarantee/ Warranty certificate/ O&M manuals (as applicable) etc. immediately on dispatch of the goods. Any addition/ exclusion to such documents shall be as specified in the Purchase Order. In case of dispatches from vendor works to site, material receipt certified by site office / Customer shall be provided. Softcopies of the above documents shall be uploaded in Pradan portal https://web.bhelhyd.co.in/mm/ immediately after dispatch of the material		Non Deviatable
B	Imports		
	i) Seller shall inform the purchaser the readiness of material along with packing details well in 30 days advance from the date of delivery. Seller shall also upload soft copy of the dispatch documents consisting of BL / AWB, Invoice, Shipping list & Test certificates and other documents as specifically indicated in the Purchase Order in PRADAN Portal (https://web.bhelhyd.co.in/mm/) within 3 days from the B/L date for sea shipment and 1 day from AWB date for Air shipment. ii) In case of CIP shipments, seller shall also inform purchaser the information about discharge port agent details and ship arrival information within 7 working days from the date of Shipment. iii) In case the material shipped in Full Containers(FCL), Seller shall ensure that the Bill of Lading should clearly spell out the following 1. Port of discharge -- "Nhavaseva"/chennai 2. Place of Delivery / Final Destination - "ICD Sanath Nagar". 3. For air consignment the port of discharge will be Hyderabad, India and consignee shall be BHEL.		
	iv) In case of Air shipment, the following dimensions of single package may be noted.		

a). Dimension of the cargo(ODC) -- > 125" x 88" x 63"

b).Weight of the cargo -- >3.5 MT.

If any package dimension or weight crosses the above set limits, it will be treated as Over Dimension Cargo (ODC) or Over Weight Cargo and seller shall inform BHEL well in advance of 20 days prior to the delivery date to enable BHEL to finalize the freight forwarder

(v). Recovery charges for non-submission of documents : -

Seller shall submit all the required documents to BHEL as prescribed in the Purchase order and NIT.

If BHEL incurs any charges such as Penalty, demurrage, container detention, wharf age, storage, Ground rent etc., due to non - compliance / non - submission of documents prescribed in Purchase Order/Tender Document/Letter of credit , the same shall be recovered from the seller as under:

1. EUROPE/USA/Black Sea/ Far East/Middle East/South East sector

A. For EX-WORKS / FCA/ FAS / FOB Sea Consignments:-

Penalty for late submission / negotiation of documents beyond 14 days shall be as under:

Sl. no	Period (From Date of Bill of Lading)	Recoverable Charges	Recoverable Charges per day per container	
		LCL per week/ Break bulk cargo per day	20FT Container	40FT Container
i	Upto 14th day	Nil	Nil	Nil
ii	15th day onward	USD 10	USD 50	USD 105

B. For CIF / CFR / CIP / CPT Sea Shipments:-

For CIF / CFR / CIP / CPT Sea Shipments, Vendor shall provide rates for detention charges after free period at the time of offer itself in case of engagement of 20FT Container and 40FT category. In case of late presentation of documents to the bank recovery will be effected from the Vendor as per the rates quoted by the Vendor at the time of offer in this regard.

In case of Break bulk cargo and LCL Demurrage/storage charges shall be recovered at rate of USD 10 per day and storage charges rate of USD 10 per week respectively shall be charged as late presentation charges.

(vi) Description of items in invoice, packing list, BL / AWB or LR shall be same as PO item description. Vendors shall ensure that invoice shall contain PAN nos. of both seller and buyer along with other tax related numbers. BHEL PAN AAACB4146P and BHEL TAN HYDB00086C

Any other additional documents sought by the statutory authorities, the same shall be produced by the seller on priority basis.

(vii) Seller shall provide package details including number of packages, gross weight, net weight etc.

(viii) The seller shall provide the following documents at the time of submission of offer :-

- No Business Connection in India declaration issued by the seller as per the format specified. (or)
- (i) No Permanent Establishment in India declaration issued by the seller as per the format specified.
(ii) Tax Residence Certificate issued by the seller's tax authorities.
(iii) Form 10F issued by the supplier.
- In case the seller has a Business Connection in India as per Section 9 of Income Tax Act or

Permanent Establishment in India as per Article 5 of Double Taxation Avoidance Agreement between India and the seller's country, the seller shall provide a withholding tax order issued by the Indian Income Tax authority for recovery of applicable tax.

7	Delivery Schedule		
A	The tendered goods shall be delivered within the period stipulated in PO . Delivery at BHEL can be accepted at the earliest, 30 days prior to delivery date as mentioned in the Purchase order. Delivery earlier than 30 days of contractual delivery date may be accepted with the written permission of BHEL -Purchase department. Goods arriving after the delivery date will be accepted only with the prior written permission of BHEL otherwise they will not be allowed inside the factory. BHEL reserves the right to reject the material, if not delivered by scheduled Purchase Order Delivery Date. (In case of imports , the final entry date of Import General Manifest (IGM) will be reckoned as delivery completion date)		Non Deviatable
B	Documents such as TC,GCs Inspection reports are to be submitted within 10 days of dispatch of these materials. C note date or Date of submission of documents whichever is later shall be considered as delivery date incase documents are not submitted within 10 days from the dispatch of the material. Supply of plant/ equipment/ stores shall not be considered complete until they have been inspected and accepted at the place and destination specified for delivery by the time stipulated under the terms & conditions of the Order/ Contract. Mere payment by itself shall not constitute acceptance of the goods or materials in any manner, whatsoever.		
8	Pricing Terms		
	Prices once quoted shall remain firm and valid during the execution of PO. Offers with PVC will be rejected outright except in cases where specifically called for in the NIT.		Non Deviatable
9	PRICE VALIDITY :		
	Unless otherwise specified, offer shall be valid for a period of 90 days from the date of bid opening (Technical bid /part-I in case of two part bid). However the prices quoted for spare parts of the Main equipment shall be kept valid for a period of 1 year from the date of Placement of PO for the main equipment.		
10	Taxes & Duties (RATE TO BE INDICATED by the bidder against the space provided)		
A	Indigenous Purchase		
	The Taxes as applicable shall be quoted in the following manner.		
i	Vendor to indicate HSN of Goods or SAC of Services.		
ii	IGST/CGST/SGST/UTGST: Rate of Tax to be quoted as extra in %		
	NOTE: Bidders to ensure correct applicability of IGST/CGST/SGST/UTGST based on the Inter / Intra state movement of goods. Taxes prevalent on the contractual delivery date or the actual delivery date (in case of delay) which ever is lower shall be applicable paid. In case Bidder has opted for GST Composition Scheme, the same may be stated explicitly both in their technical and price bids.		
iii	Any other taxes & duties not covered anywhere above may be indicated separately.		
iv	Taxes deducted at source: TDS as per the extant statute shall be recovered. In case vendor does not provide PAN details/concessional certificates, the TDS deduction shall be at the maximum percentage stipulated as per the provisions of Income Tax Act.		Non Deviatable
B.	Foreign Purchase (Imports)		
i	The offered price shall be inclusive of all the Taxes and duties as applicable in country of bidder / country of dispatch for the quoted CIP price.		Non Deviatable
ii	Taxes deducted at source: TDS as per the extant statute shall be recovered. In case vendor does not provide PAN details/concessional certificates, the TDS deduction shall be at the maximum percentage stipulated as per the provisions of Income Tax Act.		Non Deviatable
11	Payment Terms: Unless otherwise specified in Special Conditions, following shall be the terms of Payment.		

A	Indigenous: 100% payment along with taxes, freight & insurance will be made within 75 days from the date of receipt of complete documentation as per PO. However payment would be done only after receipt of original documents, including site/ Customer acknowledgement on LR (MRC - Material Receipt Certificate at site) / GR clearance at BHEL Stores. For MSEs (covered under MSME Act) which are registered and periodically renewed with BHEL, this period will be 45 days* as prescribed in the relevant act. Adherence to the above time schedule of payment is contingent upon Vendor complying with GST provisions and availment of Input Tax Credit by BHEL before the date of payment. *The taxes and duties that are reimbursed would be the ones applicable as on the contractual Purchase Order delivery date or the amount actually paid whichever is less. In case GST credit is delayed/ denied to BHEL, due to non/delayed receipt of goods and/or tax invoice or expiry of timeline prescribed in GST Law for availing such ITC, or any other reason not attributable to BHEL, GST amount shall be recoverable from Vendor along with interest levied/ leviable on BHEL.		
B	Imports:- i) 100% payment (less Indian Agency Commission, if any) shall be paid through “Usance Letter of Credit / Cash Against Documents (CAD) / Wire Transfer” with a credit period of 60 days ii) LC will be opened after successful completion of pre dispatch inspection prior to the scheduled / agreed delivery date LC will be opened within 7 working days from the date of request.		
C	Note: 1) No advance payment is acceptable. However, in exceptional/rare cases, BHEL at its discretion, may consider advance payment against Bank Guarantee valid up to receipt of material at BHEL for 110% of advance amount issued / confirmed by any of the BHEL consortium banks. 2) Wherever EMD (Earnest Money Deposit) is applicable, it may be noted that no interest will be paid on EMD and the EMD will be paid back to unsuccessful bidders within fifteen days after award of the contract. Successful bidder's EMD will be converted to SD (Security Deposit). Tender Cost wherever applicable is not refundable.		Non Deviatable
12	Penalty clause: In the event of delay in supply of goods, penalty of 0.5% per week or part there of shall be levied on the undelivered portion subject to a maximum of 10% of the order value. Penalty amount so determined along with applicable GST thereon shall be recovered.		
13	Excess materials supplied beyond tolerance limit as specified in PO, will not be accounted for.		Non Deviatable
14	Rejected materials, if any, shall be collected by the vendor within 90 days of such communication to the vendor .Beyond 90 days a ground rent of 0.25 % of the value of the material per week will be levied for a maximum period of two weeks.. Beyond this period the supplier forfeits their right to the materials.		Non Deviatable
15	Guarantee / Warranty Period : (Deviation to this clause is not acceptable.) Wherever required, and so provided in the specifications/Purchase Order, the seller shall guarantee that the goods supplied shall comply with the specifications laid down, for materials, workmanship and performance. If within the guarantee period, the delivery is found to be non-complaint, the seller shall on his own account, replace repair, or re-execute the delivery at Purchaser's discretion on the purchaser's first request or within the mutually agreed period, without prejudice to Purchaser's other legal rights. If the seller continues to default on their obligations, purchaser has the right to proceed to replace, repair or re- execute the order at the seller's expense, with or without help from third parties. Purchaser shall notify the seller of the exercise of this right in advance where ever possible. Unless otherwise specified, guarantee period shall be 12 months from the date of commissioning or 18 months from the date of supply/replacement whichever is earlier. For bought out packages which are intended to be incorporated in installations or systems the guarantee period shall not start until the time the installations or systems are commissioned, provided always that the period ends not later than 30 months after the date of supply of the goods. The guarantee period shall be extended by the period during which the goods are not in compliance. A guarantee period as described above shall apply afresh to replaced, repaired or re-executed parts of a delivery.		Non Deviatable

NOTE: Deviations (Commercial as well as Technical) from the tender specifications and conditions are generally not acceptable. However, deviation if any, shall be brought out clearly with proper justification in the offer. The deviation, if considered by BHEL, shall be loaded for comparison, while evaluating the offer. If a bidder unconditionally withdraws any deviation before price bid opening, the same shall not be loaded. Loading criteria in respect of major commercial conditions where deviations if any are accepted shall be as per clause No.16. The Vendors may specifically note the following.

16	Evaluation and Loading Criteria:
A	Evaluation of prices shall be done item-wise unless otherwise specified in the enquiry. Evaluation shall be on the basis of delivered cost, i.e. "total cost to BHEL" w.r.t the finalized technical scope and commercial conditions (after considering incidence of applicable taxes and duties and loading). For evaluation, exchange rate (TT selling rate of State Bank of India) as on the date of bid opening (Part-I, in case of two-part bids) shall be considered. If the relevant day happens to be a bank holiday, then the forex rate as on the previous bank (SBI) working day shall be taken.
B	In case of foreign bidders, the quoted CIP price shall be loaded by the following factors to arrive at the Delivered Cost:
i	- Import duty as applicable at the time of Price/ Part-II bid opening.
ii	- Port handling/ clearing charges & inland freight and insurance: @ 5% of CIP value (10% for plates, pipes & structurals).
iii	In other cases subject to acceptance by BHEL, loading for various factors (in addition to above) as the case may be will be done as follows: 0.5% for unloading at Port of Destination Marine Freight 4% and Marine Insurance 1% (9% and 1% towards Freight and Insurance respectively for Plates, Pipes, Rounds & Structurals)
C	Incase of Indigenous Bidders, Ex-works offers received (as against FOR Destination mentioned in enquiry) shall be loaded by 4% of Ex-works value (9% for plates, pipes, rounds & structurals) unless otherwise mentioned in enquiry.
D	Deviated Penalty: Any loading on penalty clause shall be 10% or to the extent to which the vendor has opted for deviation.
E	Deviated Payment Terms: Terms: In case BHEL considers any deviation in payment terms, the bids shall be loaded with 18% interest per annum to the extent of deviation.
17	Procurement directly from the manufacturers/ suppliers shall be preferred. However, no agent shall be allowed to represent more than one manufacturer/ supplier in the same tender. Moreover, either the agent could bid on behalf of the manufacturer/ supplier or the manufacturer / supplier could bid directly but not both. In case bids are received from both from the manufacturer/ supplier and the agent, bid received from the agent shall be ignored.
18	RIGHT OF REJECTION /NON- PLACEMENT OF PO: BHEL reserves the right to accept or reject any or all bid/s in full or part without assigning any reason whatsoever.
19	INTEGRITY PACT Vendors shall have to enter into Integrity Pact with BHEL as per attachment - for order value of rupees five crores and above and shall be signed by the competent authority before the issue of purchase order, failing which vendor's offer will be rejected.
20	Make in India For this Procurement , Public Procurement (Preference to Make in India) , Order 2017 dated 15.06.2017 & 28.05.2018 and subsequent Orders issued by the respective Nodal Ministry shall be applicable even if issued after issue of the NIT but before finalization of Contract / PO/ WO against this NIT . In the event of any Nodal Ministry prescribing higher or lower percentage of Purchase preference and / or local content in respect of this procurement , same shall be applicable . Preference to Make in India including counter offering will be as per the Public Procurement (Preference to Make in India) , Order 2017 available in the following links https://dipp.gov.in/sites/default/files/publicProcurement_MakeinIndia_15June2017.pdf https://dipp.gov.in/sites/default/files/Revised-PPP-MII-Order-2017_28052018.pdf Proforma for self certification for minimum local content and auditor's certification is given in Annexure III .
21	Benefits earmarked for Purchase from Micro & Small Enterprises (MSEs) – Indigenous Purchase
21 A	All Micro and Small Enterprises (MSEs) as defined in MSE Procurement Policy are exempt from Paying earnest money deposit . NSIC registered unit bidders shall submit NSIC Certificate along with bid documents. Date to be reckoned for determining the deemed validity will be the last date of Technical bid submission. Non- submission of such document will lead to consideration of their bid, at par with other bidders and MSE status of such bidders shall be shifted to Non- MSE Category till the supplier submits these documents
21 B	In tender,if MSEs quoting price within price band of L1+15% shall also be allowed to supply a portion of requirement by bringing down their price to L1 price in a situation where L1 price is from someone other than a MSE and such MSE shall be allowed to supply up to 25% of total tendered value. In case of more than one such MSE, the supply shall be shared proportionately. Out of these 25% minimum 3% shall be earmarked for MSEs owned by women and 6.25% for MSEs owned by SC/STs who submit the bid along with relevant documents . This is applicable in case of item-level evaluation tenders and divisible tenders .
21 C	If an enterprise falling under MSME category as defined in the Act, graduates to a higher category from its original category or beyond the purview of the Act, it shall continue to avail all non-tax benefits of its original category notified by the Ministry of Micro, Small and Medium Enterprise for a period of three years from the date of such graduation to the higher category.

22	Startups : For Startups Medium Enterprises, Condition of prior turnover and prior experience in Public Procurement may be relaxed subject to meeting of Quality and Technical Specifications . Startups are exempt from paying earnest money deposit .
23	For Claiming Payments for goods received at BHEL works / Site from Vendors' Works) a. Original of Invoice marked as ORIGINAL FOR RECIPIENT b. Duplicate of Invoice marked as DUPLICATE FOR TRANSPORTER c. Packing List - clearly showing number of packages, gross weight and net weight. d. Warranty/Guarantee certificates (If applicable as per PO terms) e. Insurance certificate f. Third Party Inspection Certificates. g. LR Copy signed & stamped by Site incharge / Customer for site deliveries) (For material received at BHEL payment will be made against GR for accepted quantity)
24	Inspection Measuring and Test Equipment (IMTE) whether used by the Seller/ Contractor or sub-contractor shall be calibrated, maintained and controlled. Calibration shall be valid and IMTE maintained in sound condition during usage.
25	ISO-9001, ISO14001 and OHSAS 18001 shall be complied
26	Applicable Conditions :These General conditions of Contract for Purchase apply to all enquiries, tenders, request for quotations, orders and agreements concerning the supply of goods and the rendering of related services (hereinafter referred to as "deliverables") to Bharat Heavy Electricals Limited, Ramachandrapuram , Hyderabad (hereinafter referred to as "BHEL" or the Purchaser) or its projects/customers. Any deviations from or additions to these General conditions of contract for Purchase' require Purchaser's express written consent. The general terms of business or sale of the Seller shall not apply to Purchaser. Orders, agreements and amendments thereto shall be binding if made or confirmed by the Purchaser in writing. Only the Purchasing department of the Purchaser is authorized to issue the Purchase order or any amendment thereof.
27	Being PMD Vendor, if you are not quoting against this tender enquiry, please send your regret letter positively for our reference with valid reasons for not participating in the tender enquiry. Repeated lack of response on the part of bidder may lead to deletion such PMD vendor from BHEL's approved vendor list Vendor shall ensure that PAN details are available/updated with BHEL, else Vendor shall attach PAN details with enquiry failing which offer shall be liable for rejection.
28	Kindly quote your prices in figures and words both. In case of any discrepancy in value, the prices quoted in words shall be considered for evaluation and establishing L1 Status
29	Any discount / revised offer / bids submitted by a bidder on its own shall be considered, provided it is received on or before the due date and time of offer / bid submission (Part-1). Conditional discounts shall not be considered for evaluation of tenders.
30	The bidder whose bid is technically not accepted will be informed & EMD wherever submitted shall be returned after finalization of contract. EMD shall be forfeited in the event of bidder opting out after tender opening.
31	In case of abnormal delays (beyond the maximum late delivery period as per Penalty clause) in supplies / defective supplies or non-fulfillment of any other terms and conditions given in Purchase Order, BHEL may cancel the Purchase Order in full or part thereof, and may also make the purchase of such material from elsewhere / equivalent market price at the risk and cost of the supplier. BHEL will take all reasonable steps to get the material from alternate source at optimum cost. If bidder does not agree to the above Risk Purchase Clause, BHEL reserves the right to reject the offer. Nonperformance of contract attracts penal provisions inline with BHEL's Suspension of Business dealings.
32	Any other terms and conditions of the bidder attached / referred against the tender enquiry will not be considered.
33	All drawings as also all patterns and tool supplied by BHEL or made at BHEL's expense are BHEL's property. These cannot be used or referred to any other party and must only be used in the execution of BHEL's orders.
34	Any amount payable by the consignor / supplier under any of the condition of this contract shall be liable to be adjusted against any amount payable to the consignor / supplier under any other work / contract awarded to him. This is without prejudice to any other action as may be deemed fit by BHEL.
35	The bids of the bidders who are on the banned list and also the bids of the bidders, who engage the services of the banned firms, shall be rejected. The list of firms banned by BHEL is available on BHEL web site www.bhel.com
36	Definitions
Throughout these conditions and in the specifications, the following terms shall have the meanings assigned to them, unless the subject matter or the context requires otherwise.	
36A	Purchaser' means BHEL-HPEP, Ramachandrapuram, Hyderabad-502 032 of Bharat Heavy Electricals Limited (A Govt. of India Undertaking) incorporated under the companies Act having its registered office at BHEL House, Siri fort, New Delhi-110049, India and shall be deemed to include its successors and assigns. It may also be referred to as BHEL.
36 B	'The seller' means the persons, firm, company or organization on whom the Purchase order is placed and shall be deemed to include the seller's successors, representatives, heirs, executors and administrator as the case may be. It may also be referred to as Contractor, supplier or vendor.

36 c	'Contract' shall mean and include the Purchase order incorporating various documents viz., tender/offer, letter of intent/acceptance, the General Conditions of contract and special conditions of contract for Purchase, specifications, inspection/quality plan, schedule of prices and quantities, drawings, if any enclosed are to be provided by the Purchaser or his authorized nominee and the samples or patterns if any to be provided under the provision of the contract. In case of any inconsistency or contradiction between any of the documents, the order of precedence shall be Purchase Order, LOI/LOA followed by specific conditions, special conditions of contract and general conditions of contract for commercial conditions; and specific agreement on technical conditions, special technical conditions and general technical conditions, tender/offer.
37	'Parties to the contract' shall mean the seller and the purchaser as named in the main body of the Purchase Order.
38	Ordering and confirmation of order
	The seller shall send the order acceptance in Toto within one week from the date of LOI/Purchase order or such other period as specified/agreed by the Purchaser. Purchaser reserves the right to revoke the order placed if the order confirmation differs from the original order placed. Purchaser shall only be legally bound if agreed explicitly in writing to be in agreement with the deviation. The acceptance of deliverables or supplies by Purchaser as well as payments made in this regard shall not imply acceptance of any deviations. The Purchaser order will be deemed to have been accepted if no communication to the contrary is received within one week (or the time limit as specified /agreed by the Purchaser) from the date of P.O. Purchaser, is at liberty to send signed P.O. through electronic media such as e-mail and the receipt of which shall be treated as receipt of order.
39	Execution
	The whole contract is to be executed in the most workman like manner, substantial and approved as per the contracted terms.
40	Progress Report
	The seller shall render such report as to the progress of work and in such form as may be called for by the Purchaser from time to time. The submission and acceptance of such reports shall not prejudice the rights of the purchaser in any manner. Seller shall communicate to BHEL immediately, change of address, ownership, contact person(s), the mobile numbers and e-mail of the dealing person concerned. Milestones shall be periodically updated by vendor/subcontractor through PRADAN Portal (https://web.bhelhyd.co.in/mm/). Non updation will adversely affect service rating of vendor performance.
41	Product information, Drawings and documents / Non-disclosure and Information Obligations
	Drawings, technical documents or other technical information received by one party shall not without the consent of the other party, be used for any other purpose than that for which they were provided. They may not, without the consent of the submitting party, otherwise be used or copied, reproduced, transmitted or communicated to third parties. All information and data contained in general product documentation, whether in electronic or any other form, are confidential and binding only to the extent that they are by reference expressly included in the contract. The seller shall, as per agreed date/s but not later than the date of delivery, provide free of charge any information and/or drawings which are necessary to permit the Purchaser to erect, commission, operate and maintain the product. Such information and drawings shall be supplied in the number of copies agreed upon or at least three copies of each. All intellectual properties, including designs, drawings and product information etc. exchanged during the formation and execution of the contract shall continue to be the property of the submitting party. The seller shall provide Purchaser with all information pertaining to the delivery in so far as it could be of importance to Purchaser. The seller shall not reveal confidential information to its own employees not involved with the tender/contract and its execution and delivery or to third parties, unless Purchaser has agreed to this in writing beforehand. The seller shall not be entitled to use the Purchaser's name in advertisements and other commercial publications including website without prior written permission from Purchaser. In the event of violation of the confidentiality as agreed, BHEL will take legal action as deemed fit. Non disclosure agreement to be entered as per Annexure- II wherever applicable.
42	Inspection and Testing
42A	The goods and stores shall be manufactured by approved quality system and each part/component may be inspected and tested by the Purchaser prior to shipment and shall fully comply with relevant requirements of Purchaser. Purchaser has the right to inspect at any stage during manufacture/ delivery. In the event of rejection, Purchaser shall inform the seller accordingly and Purchaser shall be entitled to replacement or repair at his discretion or may proceed to terminate or cancel the agreement. All this, does not affect Purchaser's right to recover compensation.

42 B	Purchaser or his authorized representative shall be entitled at all reasonable times during execution to inspect, examine and test at the seller's premises the material and workmanship of all stores to be supplied under the contract, and if the part of the stores are being manufactured at other premises, the seller shall obtain for purchaser or his authorized representative permission to inspect, examine and test as if the said stores are being manufactured at the seller's premises. Such inspection, examination and testing, if made shall not release the seller from any obligation under the contract. For indigenous suppliers all costs related to first inspection request shall be borne by the purchaser and the cost of subsequent inspections due to non-readiness of material/rework/ rejections shall be borne by the seller. In case of imports all inspection charges including third party inspections if any shall be borne by the seller. The cost of inspection staff/third party specified by the Purchaser shall be borne by seller unless otherwise specifically agreed. Whether the contract provides for tests on the premises of the seller or any of his sub-contractor/s, seller shall be responsible to provide such assistance, labor, materials, electricity, fuels, stores, apparatus, instruments as may be required and as may be reasonably demanded to carry out such tests efficiently. Cost of any type test or such other special tests shall be borne by the seller unless otherwise specifically agreed in the contract. The Seller shall give the authorized representative of the purchaser reasonable notice in writing of the date on and the place at which any stores will be ready for inspection/ testing as provided in the Contract. Annexure - I may be strictly be complied with for the time lines. Any delay in submission of the documents by the vendor will not alter the delivery date.
43	Quality and Condition of the Deliverables
	The seller shall be responsible for compliance with applicable technical, safety, quality, environmental requirements and other regulations in relation to his products, packaging and raw and ancillary materials.
44	Packaging and Dispatch
	The seller shall package the deliverables safely and carefully and pack them suitably in all respects considering the peculiarity of the material for normal safe transport by sea/air/rail/road to its destination suitably protected against loss, damage, corrosion in transit and the effect or tropical salt laden atmosphere. The packages shall be provided with fixtures/hooks and sling marks as may be required for easy and safe handling by mechanical means. Special packaging conditions/ environmental conditions as defined in the enquiry shall be fully complied. Each package must be marked with consignee name, P.O. number Package No. gross weight & net weight, dimensions (LxBxH) and seller's name. The packing shall allow for easy removal and checking of goods on receipt and comply with carrier's conditions of packing or established trade practices. Packing list of goods inside each package with P.O. item No. & quantity must also be fixed securely outside the box to indicate the contents. If any consignment needs special handling instruction, the same shall be clearly marked with standard symbols/instructions. Hazardous material should be notified as such and their packing, transportation and other protection must confirm to relevant regulations.
45	Delivery:
	Except as otherwise indicated in the Purchase order, delivery shall be FOR (Destination) for indigenous orders and CIP for imported orders. The delivery date (s) or delivery period (s) as stipulated in the agreement shall be firm and binding and shall apply to the entire delivery for each P.O. item. Partial shipments may however, be permitted by the purchaser on prior intimation from the Seller. Unless specifically agreed otherwise, transit insurance coverage will only be within India for imported consignments by BHEL. Accordingly, the seller shall send an intimation to the Purchase officer/Manager giving Purchase Order No., shipping particulars, Invoice value etc., immediately on dispatch of goods.
46	Penalty
	The time or period of delivery as stipulated in the schedule of delivery shall be deemed to be the essence of the contract. Should circumstances arise whereby the deadline for an agreed delivery date(s) or period(s) is expected to be exceeded, the seller shall inform Purchaser hereof without delay. If delay in delivery is caused by any of the circumstances mentioned in clause 52 (Force Majeure) or which are caused exclusively by the acts of Purchaser, the Purchaser shall extend the time for delivery by a period which is reasonable having regard to all the circumstances in the case. If the Seller delays beyond any agreed delivery date(s) or period(s), Purchaser shall levy penalty for such delay @ 0.5% per week (7 days) or part thereof on delayed portion of the order value subject to a maximum of 10% of the value of the Purchase Order. However, penalty for delayed delivery will be calculated on 100% of the purchase order value if the material supplied cannot be put to intended use. The penalty will be charged on the value of the purchase order excluding statutory levies, freight and insurance wherever not included in the price. Penalty amount so determined along with applicable GST thereon shall be recovered. Imposition, recovery or settlement of this penalty shall not affect Purchaser's right to performance, compensation and termination of the agreement. For delay analysis, period referred in Annexure-I will be considered as standard time lines for various major activities.
47	Transfer of Ownership and Risk
	The risk for the delivery remains with the seller until the goods are delivered at the agreed place. However ownership shall get transferred as per terms of purchase order in line with INCOTERMS.
48	Price, invoicing and payment

	The agreed prices are fixed prices in the currency as specified in the Purchase Order. They shall include packing, forwarding , loading and carriage to the place specified by the purchaser and are exclusive of all applicable taxes, duties etc., except for those specifically agreed by the Purchaser. Invoices shall be submitted bearing the Purchase Order number & date, item number/s and supporting documents as called for in the Purchaser order. The direct payments (including LC/documents through Bank on collection basis), shall be made by E-payment mode and not by cheque /bank drafts except in special circumstances. Vendors shall furnish the E-payment particulars in the prescribed formats duly authenticated by their respective Bankers, If not got registered earlier with the Buyer. - Invoice has to be raised quoting HSN Code of Goods or Accounting Code of Services. Invoice should mention BHEL-HPEP-HYDERABAD GSTIN: 36AAACB4146P1ZG or GSTIN of BHEL Nodal Agency as mentioned in PO.
	Indian Agency commission if payable and so specified in the Purchase order shall be paid in Indian Rupees, considering the SBI TT selling exchange rate prevailing on the date of tender opening (part 1 in case of two part bid), after successful completion of the contract. If so stipulated in the order, the seller shall furnish, on receipt of the Purchase Order or along with order acknowledgement, the billing break-up of prices (BBU) for approval by the purchaser in respect of the major items/components going into the equipment. This BBU is required by the Purchaser for admitting the claims of the seller if part shipments are contemplated and also to facilitate custom clearance after payment of duties in case of imports. In case of delay in receipt of supporting document details, consequential demurrage/wharf age /detention charges shall be to the account of the seller. Payment does not imply in any respect whatsoever a waiver of Purchaser's right to performance of the agreement. Purchaser is entitled to set off claimable debts against claimable liabilities with the seller by means of a setoff Note.
49	Contract variations; Increase or decrease in the scope of supply
	Purchaser may vary the contracted scope during execution due to exigencies of project requirement. If the seller is of the opinion that the variation has an effect on the agreed price or delivery period, Purchaser shall be informed of this immediately in writing along with technical details, and in the event of additional work, submit a quotation with regards to the price and period involved, as well as the effect this additional work will have on the other work to be performed by the seller. Provided, that if unit rates are available in the contract, the same shall be applied to such additional work. The seller shall not perform additional work before purchaser has issued written instructions/amendment to the purchase order to that effect. The work which the seller should have or could have anticipated in terms of delivering the service (s) and functionality (ies) as described in this agreement should be executed by the vendor without any price implication.
50	Short shipments/ warranty/guarantee replacements
	In case of any short shipment during initial supply which is subsequently dispatched by the seller or any guarantee / warranty replacements shall be dispatched on "DDP-Delivered duty paid BHEL stores" basis for imported items and "FOR-BHEL Stores/designated destination" basis for indigenous items. Taxes, if any paid by indigenous vendor for short supply, guarantee /warranty replacement, repair activity shall be to vendor's account only. Vendor has to raise a credit note for short supplied quantity as per GST provisions.
51	Rejection/Replacement
	The seller shall arrange replacement / repair under its obligation under the contract within one month from the date of intimation or mutually agreed period. The rejected goods shall be taken away by the seller and replaced on DDP/FOR-BHEL Stores/designated destination basis within such period. In the event of the seller's failure to comply. Purchaser may take appropriate action including disposal of rejections, at the cost and risk of the seller. Vendor has to raise a credit note for rejected quantity as per GST provisions.
	In case defects attributable to seller are detected during processing of the goods at purchaser's / his subcontractor works, the seller shall be responsible for replacement /repair of the goods as required by the purchaser at seller's cost.
52	Export Administration Regulations
	If a delivery includes such technology and / or supply that is subjected to the export regulations the seller shall obtain due permissions, approvals, license etc.
53	Cancellation / Termination of contract and risk purchase
	Purchaser shall have the right to completely or partially terminate the agreement by means of written notice to that effect without prejudicing their other rights in the event that : -The seller is declared bankrupt, its business has been shut down or liquidated, a substantial part of its assets have been attached/destroyed, or the business has been transferred to a third party. -Any misrepresentation or hiding of material fact if detected at a later stage. -The delivery is rejected after inspection or re-inspection. -In the event of termination, the risk of the items already delivered but not of use to Purchaser, as determined by purchaser, remains with the seller. The items shall then be at the seller's disposal and they are to be collected by the seller. The seller shall refund any payments made by purchaser in terms of the terminated agreement immediately, not later than 30 days, - In the event of Cancellation/ termination of contract, BHEL reserves the right to procure the items which are not delivered as per PO and charge the excess cost from the defaulting seller. Incase the excess cost is not repaid by or recovered from the defaulting seller within 30 days, apart from legal recourse for effecting such recoveries, Penal action in line with BHEL's Suspension of Business dealings will be taken.
54	Force Majeure

	The supplier shall not be considered in default if delay occurs due to causes beyond their control such as Acts of God, Natural calamities, Fire, Frost, Flood, Civil War, civil commotion, riot, Government Restrictions. Only those causes that have duration of more than seven days shall be considered cause of force majeure. Notification to this effect duly certified by local chamber of commerce/statutory authorities with supporting documents shall be given by the supplier to BHEL by registered letter/courier service immediately without loss of time. In the event of delay due to such causes the delivery schedule shall be extended for a length of time equal to the period of Force Majeure or at the option of BHEL the order may be cancelled. Such cancellation would be without any liability whatsoever on the part of BHEL. In the event of such cancellation the supplier shall refund any amount advanced or paid to the supplier by BHEL and deliver back any material issued to him by BHEL and release facilities, if any provided by BHEL.
55	Non-waiver of Defaults
	If any individual provision of the contract is invalid, the other provisions shall not be affected.
56	Settlement of Disputes
	Except as otherwise specifically provided in the contract, all disputes concerning questions of the facts arising under the contract, shall be decided by the Purchaser, subject to written appeal by the seller to the purchaser, whose decision shall be final.
	Any disputes of differences shall to the extent possible be settled amicably between the parties thereto, failing which the disputed issues shall be settled through arbitration.
	The seller shall continue to perform the contract, pending settlement of disputes(s).
57	Arbitration & conciliation clause and Interest clause : (1).Except as provided elsewhere in this contract, in case amicable settlement is not reached between the parties, in respect of any dispute or difference; arising out of the formation, breach, termination, validity or execution of the contract; or, the respective rights and liabilities of the parties; or, in relation to interpretation of any provision of the contract; or, in any manner touching upon the contract, then, either party may, by a notice in writing to the other party refer such dispute or difference to the sole arbitration of an arbitrator appointed by head of the BHEL unit issuing the contract. The Arbitrator shall pass a reasoned award and the award of the Arbitrator shall be final and binding upon the parties. Subject as aforesaid, the provisions of Arbitration and Conciliation Act 1996 (India) or statutory modifications or re-enactments thereof and the rules made thereunder and for the time being in force shall apply to the arbitration proceedings under this clause, the seat of arbitration shall be at Hyderabad. The cost of arbitration shall be borne as per the award of the Arbitrator. Subject to the arbitration in terms of clause 55, the courts at Sangareddy, Telangana State shall have exclusive jurisdiction over any matter arising out of or in connection with this contract. Notwithstanding the existence or any dispute or differences and / or reference for the arbitration, the contractor shall proceed with and continue without hindrance the performance of its obligations under this contract with due diligence and expedition in a professional manner except where the contract has been terminated by either party in terms of this contract. In case of contract with Public Sector Enterprise (PSE) or a Government Department, the following shall be applicable: In the event of any dispute or difference relating to the interpretation and application of the provisions of the contract, such dispute or difference shall be referred by either party for arbitration to the sole arbitrator in the Department of Public Enterprises to be nominated by the secretary to the Government of India in-charge of the Department of Public Enterprises. The Arbitration and Conciliation Act, 1996 shall not be applicable to arbitration under this clause. The award of the arbitrator shall be binding upon the parties to the dispute, provided, however, any party aggrieved by such award may make further reference for setting aside or revision of the award to the Law Secretary, Department of Legal Affairs, Ministry of Law and justice, Government of India. Upon such reference the dispute shall be decided by the Law secretary or the special Secretary or Additional secretary when so authorized by the Law secretary, whose decision shall bind the parties hereto finally and conclusively. The parties to the dispute will share equally the cost of arbitration as intimated by the arbitrator. (2) INTEREST CLAUSE: In order to bring uniformity in all the contracts / agreements entered between BHEL and its contractors / vendors / suppliers / service providers etc., it is hereby advised to incorporate the following clause in all tenders and agreements. “No interest shall be payable by BHEL on earnest money or security deposit or any money due to the contractor by BHEL.”
58	Applicable Laws and jurisdiction of Courts
	This agreement shall be construed and interpreted in accordance with the laws of India and shall have exclusive jurisdiction of Sangareddy/Hyderabad courts, Telangana, India.
59	BHEL-Fraud prevention policy shall be adhered to.
	The Bidder along with its associate/ Collaborators/ Sub-contractors/ sub-vendors/ consultants/ service providers shall strictly adhere to BHEL Fraud Prevention policy displayed on BHEL Website http://www.bhel.com and shall immediately bring to the notice of BHEL management about any fraud or suspected fraud as soon as it comes to their notice.
	Fraud prevention policy and list of nodal officers is hosted on BHEL Hyderabad website web.bhelhyd.co.in
Note: Purchase officer has to fill Annexure-I while sending enquiry	



Bharat Heavy Electricals Limited
 Ramachandrapuram: Hyderabad – 502032
 Purchase Department
 Product Division: Heat Exchangers & Fabrication
 Ph. No. 040 2318 2522/ 2103

ITB Annexure-I

Enquiry No. E6A1T86687 date 04.01.2020

Following major activity timelines shall be considered for Indigenous/ Foreign purchases

S.NO	Activity	Agency	Timeline	Cumulative Weeks from the date of PO
1	PO acknowledgement	Vendor	01 Week from PO	01
2a	Submission of Drawings and QP (R00)	Vendor	02 Week from PO	02
2b	Approval/ Review of Drawings and QP	BHEL/ Customer	02 week from the date of submission	04
2c	Submission of Drawings and QP (R01)	Vendor	01 Week from the date of receipt of comment	05
2d	Approval/ Review of Drawings and QP	BHEL/ Customer	02 week from the date of resubmission	07*
3	Manufacturing & completion of job	Vendor	20 week from the date of approval of Document or Manufacturing clearance.	27
4	Inspection completion	Self/ BHEL/ Third party inspection agency	01 week from inspection call date	28
5	Dispatch Instructions	BHEL	00 week from inspection report	28
6	Receipt of Material	Vendor	02 week from Dispatch instructions	30

Total: 30 weeks

* In case of Drawings and QP approval continued beyond Revision-01 by end customer, vendor need to revise & submit the documents within 03 days. Delay more than 03days will be in seller's account.

Bidder's Sign with date

Certificate by Chartered Accountant on letter head

This is to Certify that M/s.....,
(hereinafter referred to as 'company') having its registered office at
Is registered under MSMED Act 2006, (Entrepreneur Memorandum No (Part-II).....
Dtd:....., Category:.....(Micro/Small). (Copy enclosed).

Further verified from the Books of Accounts that the investment of the company as on
date..... as per MSMED Act 2006 is as follows:

1. **For Manufacturing Enterprises:** Investment in plant and machinery (i.e. original cost excluding land and building and the items specified by the Ministry of Small Scale Industries vide its notification No.S.O.1722€ dated October 5, 2006:
Rs.....Lacs
2. **For Service Enterprises:** Investment in equipment (original cost excluding land building and furniture, fittings and other items not directly related to the service rendered or as may be notified under the MSMED Act, 2006:
Rs.....Lacs

The above investment of Rs.....Lacs is within permissible limit of Rs.....Lacs forMicro / Small (Strike off which is not applicable) Category under MSMED Act 2006.

Date:

(Signature)

Name –

Membership number-

Seal of Chartered Accountant

SPECIAL CONDITIONS OF CONTRACT (SCC)			
Sl.No	Enquiry number: : E6A1T86687 date 04.01.2020	Supplier Acceptance	Remarks
1	Confirm complete compliance to BHEL Specification and submit the following Filled signed and stamped		
	<u>Technical Specifications</u>		
	1) Customer Datasheet: TPS-MM-DS-TECH-SPEC-MOPDT-R00 2) TC 64515 Rev 01 3)Annexure I to purchase spec TC64515 Rev 01 4) Annexure II (PTR) to purchase spec TC64515 Rev 01 5) Annexure III (TDS) to purchase spec TC64515 Rev 01 6) Annexure IV (PS) to purchase spec TC64515 Rev 01 7) Annexure V (CL) to purchase spec TC64515 Rev 01 8) TC 64515 Rev 01 & Terminal point sketch provided at clause 4.0 of this annexure 9) Customer's Instruments specification TPS-MM-DS-TECH-SPEC-INSTRUMNT-R00 applicable for instruments/ valve in scope of supply. 10) Customer's Pipe/ Fittings specification TPS-MM-DS-TECH-SPEC-PIPE-FITTING-VALVE-R00, applicable for Piping/ Fittings in scope of supply. 11)Annex-I (PQC) sub supplier questionire 12)Pre Qualification Criteria(PQC) 13) Vendor List -C&I Items to be followed		
2	Evaluation of L1 bidder shall be Lumpsum lowest destination cost of all items		Information
3	Price Bids shall be as per Annexure IV (Price Schedule) to purchase spec TC64515 Rev 01. Vendor has to quote for all the items. Incomplete offers shall be liable to rejection.		NON DEVIATABLE
4	Packing & Forwarding charges (shall be inclusive in quoted material price)		
5	Terms of delivery shall be <u>i) FOR Destination for Indegenous Supplier</u> (Freight & Insurance shall be inclusive in material price & to be paid by supplier). All items shall be dispatched to BHEL Hyderabad 06 store. Date of receipt of material at BHEL 06 Stores Or Receipt of all original documents as purchase order whichever is later shall be considered as delivery date for the purpose of penalty.		
	<u>ii) CIP Mumbai India for foreign supplier</u> a) As per Incoterm (latest). b) IGM date in bill of entry issued by customs shall be delivery date for the purpose of penalty. c) Exchange rate for Foreign Currency to INR shall be as per SBI Exchange rate (TT Seeling rate) as on Technical Bid Opening date. If the relevant day happens to be a bank holiday, then the forex rate as on the previous bank (SBI) working day shall be taken.		
6	Inspection & Certification by BHEL TPIA / BHEL TPIA OR CUSTOMER jointly as per Approved QP post ordering i) For Indigenous vendor: TPIA Inspection charges are in BHEL account.Vendor's offer will be loaded by appropriate percentage for evaluation. Currently it is 0.26% towards BHEL TPI inspection. All Inspections within Indian workplaces.		
	ii) For Foreign vendors: TPIA Inspection charges (Outside India) shall be in Suppliers account and all inspection charges should be quoted within material price. Supplier has to arrange BHEL approved foreign TPIA-LLOYDS/ TUV NORD/ DNV/ BV for all inspection and certification.		
7	Your offer shall be in two part bid system : a) Part-1 bid i.e,Techno commercial bid (with all technical and commercial tems and conditions. (i).Duly filled in Signed and stamped PQC along with all supporting documents and necessary confirmation as mentioned in Sl.No.1. (ii) Duly filled in signed and stamped copy of Instructions to Bidder (ITB) along with necessary enclosures i.e,Annexure-I,Annexure-II and Annexure-III(as applicable). (iii). Duly filled in signed and stamped copy of Special Contract Conditions (SCC). (iv). Documents / declarations in compliance with Annexure -A,B (if applicable). (v). Signed copy of Priced Sheet i.e,Annexure-IV without price. b) Part-2 bid i.e, Price bid in separate sealed cover indicating our enquiry No. date and due date.		

SPECIAL CONDITIONS OF CONTRACT (SCC)			
Sl.No	Enquiry number: : E6A1T86687 date 04.01.2020	Supplier Acceptance	Remarks
8	GUIDELINES REGARDING DEALINGS WITH INDIAN AGENTS OF FOREIGN SUPPLIERS:		
	(i). It shall be incumbent on the Indian agent and the foreign principal to adhere to the relevant guidelines of Government of India, issued from time to time.		
	(ii). The Agency Agreement should specify the precise relationship between the foreign OEM / foreign principal and their Indian agent and their mutual interest in the business. All services to be rendered by agent/ associate, whether of general nature or in relation to the particular contract, must be clearly stated by the foreign supplier/ Indian agent. Any payment, which the agent or associate receives in India or abroad from the OEM, whether as commission or as a general retainer fee should be brought on record in the Agreement and be made explicit in order to ensure compliance to laws of the country.		
	(iii). Any agency commission to be paid by BHEL to the Indian agent shall be in Indian currency only.		
	(iv). Tax deduction at source is applicable to the agency commission paid to the Indian agent as per the prevailing rules.		
	(v). In the absence of any agency agreement, BHEL shall not deal with any Indian agent (authorized representatives / associate / consultant, or by whatever name called) and shall deal directly with the foreign principal only for all correspondence and business purposes.		
	(vi). The “Guidelines for Indian Agents of Foreign Suppliers” enclosed at annexure –‘A’ shall apply in all such cases.		
	(vii). The supply and execution of the Purchase Order (including indigenous supplies/ service) shall be in the scope of the OEM/ foreign principal. The OEM/ foreign principal should submit their offer inclusive of all indigenous supplies/ services and evaluation will be based on ‘total cost to BHEL’. In case OEM/ foreign principal recommends placement of order(s) towards indigenous portion of supplies/ services on Indian supplier(s)/ agent on their behalf, the credentials/ capacity/ capability of the Indian supplier(s)/ agent to make the supplies/ services shall be checked by BHEL as per the extant guidelines, before opening of price bids. In this regard, details may be checked as per Annexure-B (copy enclosed). It will be the responsibility of the OEM/ foreign principal to get acquainted with the evaluation requirements of Indian supplier/ agent as per SEARP available on www.bhel.com.		
9	(viii). As per directives of CENTRAL VIGILANCE COMMISSION, GOVERNMENT OF INDIA, one agent can not represent two or more suppliers or quote on their behalf in a particular tender. If so found at any stage, BHEL Hyderabad is likely to cancel Enquiries / POs to such suppliers. Further, such Indian Agent is likely to be de-listed (Black listed for business from BHEL).		
	FINANCIAL STANDING: Indian Bidders: Vendor to submit annual Financial Turnover during the Past 3 Years along with copy of 3 years Audited Balance Sheet. Foreign Bidders: Vendor to submit copy of latest D&B Report.		
10	Offer validity should be 90 days minimum from the date of technical bid opening date.		
11	Revised offer / Price impact/Addition of non quoted item is NOT allowed after opening of Technical bid. Revised offer may be asked only in the event of change in techno-commercial terms/scope of supply made by BHEL having price impact.		
12	The quoted rates are to be firm till the execution of order		
13	Vendor shall submit drawings,data sheets,QAP & Endorsement sheet if any for the approval of BHEL & for our customer approval if required.		
14	Delivery: Materials should be delivered within 30 Weeks from the date of PO Note: a)For delivery period longer than indicated above, quoted price shall be loaded by 0.5% per week during evaluation of offer. b)Delivery is critical for evaluation of offer. Offers with delivery period beyond one month grace period are liable for rejection.		
15	Duties as applicable (Mention clearly with values which ever is applicable & whether Extra or inclusive in Quoted price) Mention item wise HSN/SAC & GST rates		

SPECIAL CONDITIONS OF CONTRACT (SCC)			
Sl.No	Enquiry number: : E6A1T86687 date 04.01.2020	Supplier Acceptance	Remarks
16	A guarantee certificate for 18 MONTHS OF TROUBLE FREE PERFORMANCE FROM THE DATE OF SHIPMENT (SUPPLY) OR 12 MONTHS FROM THE DATE OF COMMISSIONING WHICHEVER IS EARLIER SHALL BE SUPPLIED.		
17	Deviation to any Technical / Commercial terms may be laible for rejection.		
18	Terms and Conditions: Vendor is requested to furnish all details of the offer in BHEL formats. In case of any discrepancy between information furnished here and those furnished elsewhere in the bid, the information furnished in this document only shall be considered, and those furnished else where which are contradictory to the terms agreed in BHEL formats shall be ignored.		
19	Reverse Auction:- BHEL reserves the right to go for Reverse Auction (RA) (Guidelines as available on www.bhel.com) instead of opening the sealed envelope price bid, submitted by the bidder. This will be decided after techno-commercial evaluation. Bidders to give their acceptance with the offer for participation in RA. Non-acceptance to participate in RA may result in non-consideration of their bids, in case BHEL decides to go for RA. Those bidders who have given their acceptance to participate in Reverse Auction will have to necessarily submit 'Process compliance form' (to the designated service provider) as well as 'Online sealed bid' in the Reverse Auction. Non-submission of 'Process compliance form' or 'Online sealed bid' by the agreed bidder(s) will be considered as tampering of the tender process and will invite action by BHEL as per extant guidelines for suspension of business dealings with suppliers/ contractors (as available on www.bhel.com). The bidders have to necessarily submit online sealed bid less than or equal to their envelope sealed price bid already submitted to BHEL along with the offer. The envelope sealed price bid of successful L1 bidder in RA, if conducted, shall also be opened after RA and the order will be placed on lower of the two bids (RA closing price & envelope sealed price) thus obtained. The bidder having submitted this offer specifically agrees to this condition and undertakes to execute the contract on thus awarded rates. If it is found that L1 bidder has quoted higher in online sealed bid in comparison to envelope sealed bid for any item(s), the bidder will be issued a warning letter to this effect. However, if the same bidder again defaults on this count in any subsequent tender in the unit, it will be considered as fraud and will invite action by BHEL as per extant guidelines for suspension of business dealings with suppliers/ contractors (as available on www.bhel.com). As a reminder to the bidders, system will flash following message (in red color) during the course of "online sealed bid": "Bidders to submit online sealed bid less than or equal to envelope sealed bid already submitted to BHEL"		
20	MSE suppliers can avail the intended benefits only if they submit along with the offer, attested copies of either EM II Certificate having deemed validity (Five years from the date of issue of acknowledgement in EM II) or valid NSIC certificate or EM II Certificate along with attested copy of a CA certificate (Format enclosed at Annexure -1 where deemed validity of the EM II certificate of five years has expired) applicable for the relevant financial year (latest audited). Date to be reckoned for determining the deemed validity will be the date of bid opening (Part 1 in case of two part bid). Non submission of such documents will lead to consideration of their bid at par with other bidders. No benefit shall be applicable for this enquiry if any deficiency in the above required documents are not submitted before price bid opening. If the tender is to be submitted through e- procurement portal, then the above required documents are to be uploaded on the portal. Documents should be notarized or attested by a Gazetted officer.		
Note	1) Vendor shall furnish all the offer details in SCC & ITB only. Information furnished elsewhere if any, as to be consistent with details furnished in SCC & ITB documents. In case of any discrepancy, information furnished in ITB & SCC shall prevail and become final & binding. ITB & SCC shall be submitted by duly filled signed & stamped. 2) The bidders while submitting documents for registration or in response to NIT/ Tender etc. are required to ensure that- Documents submitted with the offer shall be signed and stamped in each page by authorized representative of the bidder. 3) FRAUD PREVENTION POLICY:: The bidder along with its associate / collaborators / sub-contractors / sub-vendors / consultants / service providers shall strictly adhere to BHEL Fraud Prevention Policy displayed on BHEL website http:// www.bhel.com and shall immediately bring to the notice of BHEL Management about any fraud or suspected fraud as soon as it comes to their notice.		

Signature & stamp of vendor