



**Annexure – I - R01 to purchase specification TC64515-R02
TURBINES AND COMPRESSORS
BHEL, HYDERABAD**

R01

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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 02 & 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.

01	Clause 3.0- scope of supply revised		SBJ	PD Mahulikar	20.01.2020
Rev. No.	Revisions	Prepared:	Reviewed:	Approved	Date
00	Issue	SBJ	SBJ	P S V S K	06.12.2019

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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-R02

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

COMP. FILE NAME

TC 5 4362-R00

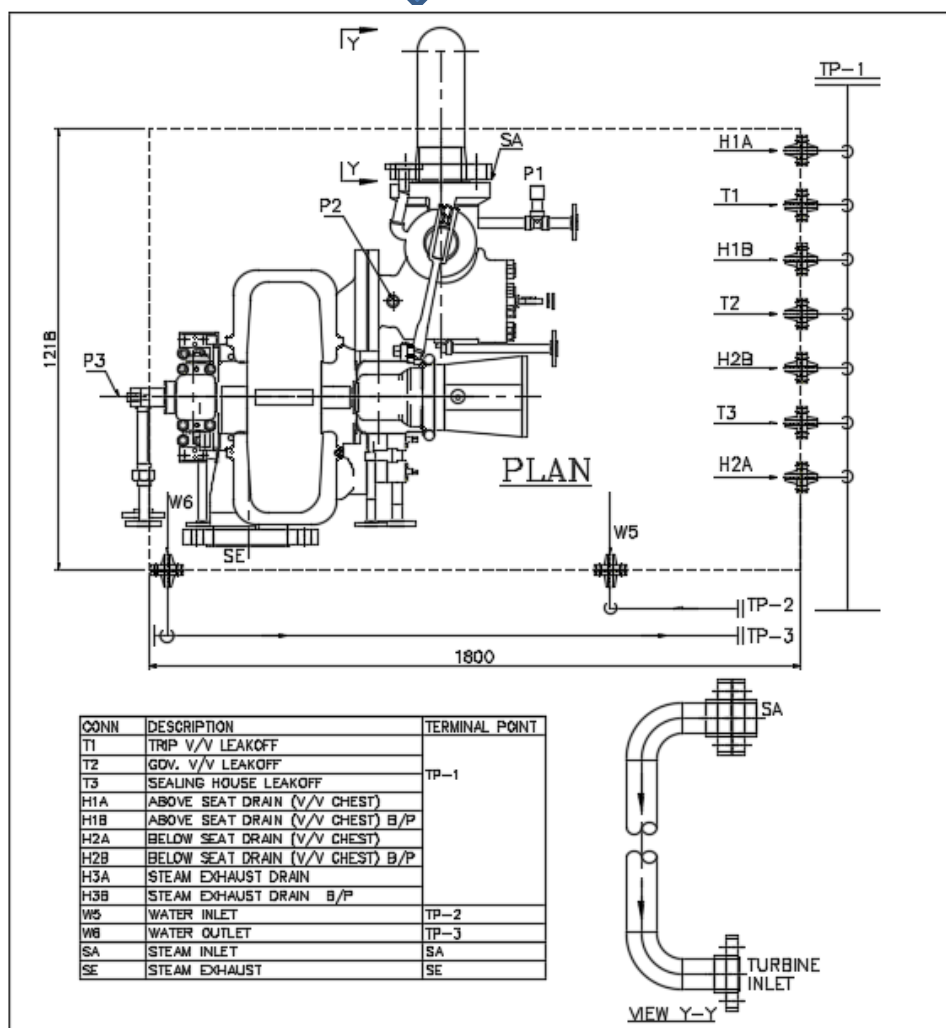
Ref. Doc.

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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
l)	Spare set of 3nos. of Speed probe (MPU's) and 3nos. of Powered tachometer (local display) along with extension cable up to 10metres.	TC9764515380	1 Set

4.0 Terminal Points detail**5.0 ENCLOSURES:**

- 1) Customer Datasheet: TPS-MM-DS-TECH-SPEC-MOPDT-R00
- 2) TC 64515 Rev 02
- 3) Annexures of TC 64515-R02
- 4) TC 64515 Rev 02 & 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