



PRODUCT STANDARD
TURBINES AND COMPRESSORS
HYDERABAD

TC-6-2627

REV No.: **00**

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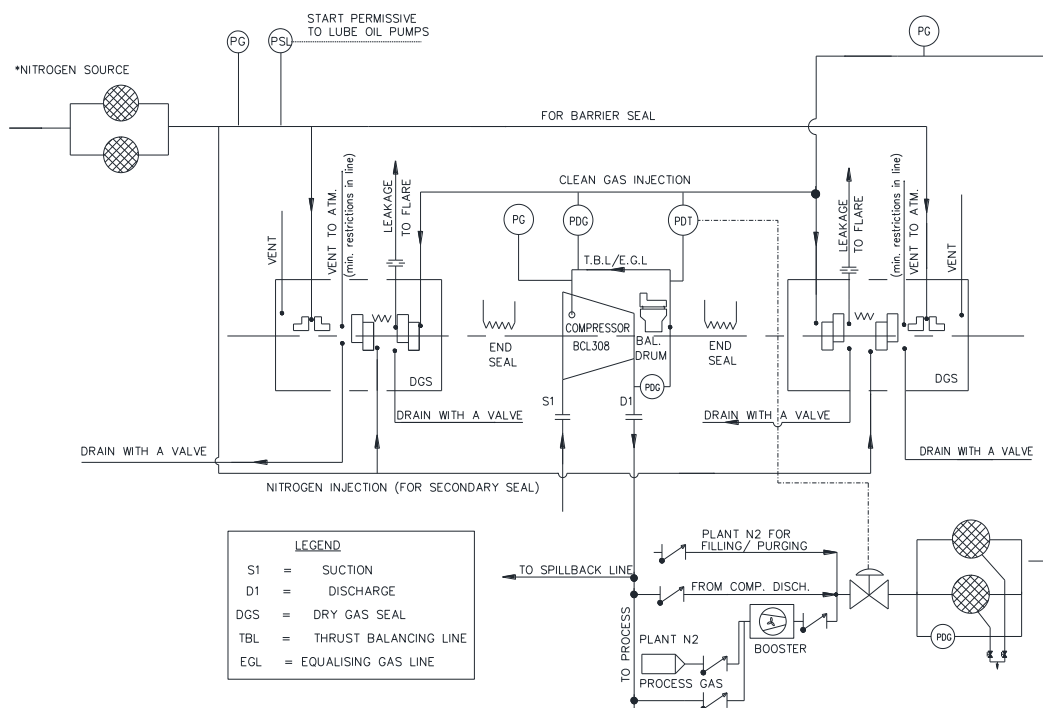
JOB SPECIFICATION OF DRY GAS SEALS

PROJECT: M/s APL ASSAM NATURAL GAS

1. GENERAL SPECIFICATION:

For general details of dry gas seals, please refer General Specification No.TC52357
For Seal Shaft and Housing Dimensions, please refer Specification No.TC52508

2. SCHEMATIC OF GAS SEAL SYSTEM



For a detailed scheme, refer to Seal gas P&ID as provided in Dry Gas Seal skid specification.

Scope of supply of supporting seal gas system (along with filter skid) is covered under a separate specification vide TC55450

3. SEAL PROCUREMENT DETAILS

3.1 DRY GAS SEAL CONFIGURATION

SINGLE [] DOUBLE [] TANDEM [X] TRIPLE []

3.2 DRY GAS SEAL TYPE:

UNIDIRECTIONAL [] BIDIRECTIONAL [X]

Rev. No.	Revisions	Prepared	Approved	Date
00	Refer to record of revisions	SUGUNA	YVRL	03.02.17



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3.3 INTERMEDIATE LABYRINTH: Yes / ~~No~~**3.4 BARRIER SEAL:** CARBON RING TERTIARY [X] LABYRINTH SEAL []**3.5 SEAL CODE DESCRIPTION:**

Var	Description	BHEL Matl code
01	Tandem type Bi directional Dry Gas Seal (Φ112) with Barrier seal	TC9762627016
02	DGS Assy/Dis Assy. Fixture (Φ112)	TC9762627024

4. SEAL HOUSING & SHAFT DIMENSIONS

Please refer TC52508 Var. No 14 (DGS DIA 112 BCL300/A / BCL400 FOR END MOUNTED BEARING DESIGN) for Seal housing and shaft dimensions.

All the interface assembly parts including outer closing cover with its pin, "O" rings, tolerance strips (as applicable), keys, locating/ anti-rotation pins, circlips etc. are in vendor scope.

The outer closing cover shall be provided with the milled projections as shown in the sketch to facilitate free oil drain.

The dimensions indicated in the sketch shall be strictly adhered to.

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5.1. DATA FOR SEAL DESIGN

5.1. DATA FOR SEAL DESIGN

OPERATING CONDITION		Rated	Rated_Min MW	Rated_Max MW	Normal	Normal_Min MW	Normal_Max MW	Start-up
Gas composition		← As per Annexure I →						
Average Mol. Wt.		17.60	15.50	18.50	17.60	15.50	18.50	17.19
Suc. Pr. (Kg/cm ² -a)		9.80	9.80	9.80	15.0	15.0	15.0	5.8
Dis. Pr. (Kg/cm ² -a)		34.4	34.4	34.4	34.4	34.4	34.4	16.1
Suc. Temp (°C)		30	30	30	30	30	30	30
Dis. Temp (°C)		158.71	165.63	153.5	111.99	116.2	108.71	139.83
Pr. in primary injection line (kg/cm ² a) Differential pressure of 0.5 kg/cm ² is considered with respect to balance line pressure. Vendor to recommend if any change is required		10.30	10.30	10.30	15.50	15.50	15.50	6.30
Temp. in primary injection line (°C)		158.71	165.63	153.5	111.99	116.2	108.71	139.83
Back pressure in primary vent		Normal 0.3 (kg/cm ² -g) / Maximum 1.7 (kg/cm ² -g)						
Total clean gas leakage into the compressor through the end lab seals (both ends)	Nor (kg/hr)	91	85	94	120	111	123	71
	Nor (Am ³ /hr)	18	20	18	14	15	14	23
	Max (Kg/hr)	137	127	141	180	167	185	107
	Max (Am ³ /hr)	28	30	27	22	23	21	35
System settling out press. (kg/cm ² -g)		34.4 (kg/cm ² -g)						
Shaft speed (rpm)		12745	13518	12441	9867	10475	9631	10808
Gas for Sec. Seal		Nitrogen						
Gas for Barrier Seal		Nitrogen						
Design Criteria for Mechanical stability of Dry Gas Seals								
Min. mechanical design pressure for DGS		37.0 (Kg/cm ² -g)						
Mechanical design temperature for DGS		Min → -20°C Max → 200°C						



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- # Performance Guarantee case is "NORMAL" of Table 5.1
- Rated Speed is 13518 RPM
- Maximum Continuous Speed(MCS) is 14194 RPM
- Slow roll requirement: NA

5.2. AMBIENT CONDITIONS

Temperature	:	Min → 5°C Nor→-- Max → 38°C Mech. degn. → 38°C
Relative Humidity	:	Min → 62.3% Nor→--% Max → 95% Mech. degn. → 88%

5.3. GAS COMPOSITION FOR VARIOUS CONTINUOUS OPERATING CONDITIONS:

The gas composition for all the above operating conditions is furnished at **Annexure-1**

5.4. SEALING GAS

Primary Seal	For normal operation	Dry and filtered process gas
	For startup with process gas	Dry and filtered process gas from Seal gas booster.
	For startup with Nitrogen	Dry and filtered N2 from Seal gas booster.
	For settle out / startup from settle out	Dry and filtered process gas from Seal gas booster.
Secondary Seal		Nitrogen / plugged
Barrier Seal		Nitrogen

Gas	Parameter	Min	Nor	Max	Mech. Design
Nitrogen	Pressure Kg/Cm ² g	4.5	6.5	7	10.5
	Temperature °C		38		65
Sweet Gas	Pressure Kg/Cm ² g	NA			
	Temperature °C				
Instrument Air	Pressure Kg/Cm ² g	NA			
	Temperature °C				



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6. SPECIAL POINTS

Dry gas seal vendor shall submit written confirmation in their letterhead for the following:

- a. The spare seal (not installed in casing) shall be suitable for use without any refurbishment for at least 5 years from the date of supply. Vendor shall provide necessary storage conditions to comply with the above.
- b. If the spare seals are not used at all before 5 years and if the vendor's design standard practice is calling for any refurbishment / revalidation / requalification, after 5 years but before 10 years period vendor shall accept to refurbish the spare seals free of charge for one time to the end customer.
- c. If the spare seals are used before 5 years, the above Part-b is not applicable.

7. Applicable Standards / Codes

7.1. BHEL General Specification No. TC52357.

1. BHEL Housing Dimension Specification No. TC52508 Var 14

7.2. API 617 – 7th edition

7.3. API 614 – 5th edition

7.4. NACE standard MR0103

ANNEXURE – 1**GAS COMPOSITION**

CONSTITUENT	RATED/ NORMAL	RATED_MINMW/ NORM_MINMW	RATED_MAXMW/ NORM_MAXMW	START UP
METHANE	92.3	85.42	90.69	87.762
ETHANE	4.17	0.17	4.17	3.96
PROPANE	0.79	0.77	0.79	0.75
N-BUTANE	0.1	0.1	0.1	0.09
I-BUTANE	0.01	0.01	0.01	0.009
N-PENTANE	0.05	0.05	1.66	0.05
N-HEXANE	0.05	0.05	0.05	0.05
2-METHYL-1-BUTEN	0.03	0.03	0.03	0.03
HYDROGEN	0	10.9	0	3.73
NITROGEN	0.5	0.5	0.5	0.48
CARBON MONOXIDE	0	0	0	0.87
CARBON DIOXIDE	2	2	2	2.22
MOLECULAR WEIGHT	17.6	15.5	18.5	17.19



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RECORD OF REVISIONS

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