



Title: Operation of Pure Steam Generator System

SOP No.:		Revision No.:	00
Effective Date:		Supersedes No.	Nil
Review Date:		Page No.	1 of 10

1.0 OBJECTIVE:

To lay down a procedure for Operation of Pure Steam Generator System.

2.0 SCOPE:

This SOP is applicable for the Operation of Pure Steam Generation System.

3.0 RESPONSIBILITY:

Operator / Operating Person-Engineering

4.0 ACCOUNTABILITY:

Head-Engineering

5.0 ABBREVIATIONS:

Amps	Ampere
GRC	Gas removing column
G.C.	Gas Cooler
ID No.	Identification Number
kg/cm ²	Kilogram per centimeter square
Ltd.	Limited
HMI	Human Machine Interface
No.	Number
pH	Potential of Hydrogen
PLC	Programmable Logic Controller
PSG	Pure Steam Generator
Pvt.	Private

6.0 PROCEDURE:

6.1 Start-up Procedure for 500 & 300 kg Pure Steam Generator:

6.1.1 Switch “ON” Main Power Supply.

6.1.2 Switch “ON” Auto Mode and check & ensure the parameter settings.

6.1.3 Press the Start from HMI to operate the PSG & ensure the header air vent is extended up to the stand height.

6.1.4 Check and ensure the operation of feed pump.

6.1.5 Open the Main Steam Valve from steam line header & ensure that Steam pressure should be in between 03 to 06 kg/cm².



Title: Operation of Pure Steam Generator System

SOP No.:		Revision No.:	00
Effective Date:		Supersedes No.	Nil
Review Date:		Page No.	2 of 10

- 6.1.6 Check and ensure purified water availability in the loop & respective valve will operate automatically as per requirements.
- 6.1.7 Set the Feed Water Flow Rate as per the requirement for 500 kg & 300 kg that is 400 ± 50 & 200 ± 30 liters per hour.
- 6.1.8 Load the Paper in the printer & switch “ON” the Printer.
- 6.1.9 During auto mode all the process parameter will monitor by the system as per specified limit.
- 6.1.10 Maintenance mode is provided for the maintenance purpose of the equipment only.

6.2 How To Stop Machine (Shutdown):

- 6.2.1 Press stop button from HMI.
- 6.2.2 Feed Pump will stop automatically.
- 6.2.3 Pure steam pressure reaches 0.2 bar then Plant Steam Inlet Valve get off automatically.
- 6.2.4 When GRC column temperature reach below 105°C then purging valve shall operate to drain the condensate water.
- 6.2.5 After completion of GRC drain time then machine shutdown will completed.
- 6.2.6 Open all manually operated valves to drain out all remaining water (manual valve provided in system)
- 6.2.7 After some time, Close the all manually operated valves
- 6.2.8 Switch OFF the Main supply

6.3 Functional Description:

6.3.1 Pure Steam Generation Process:

- 6.3.1.1 Separate Non Condensable gas from feed water through Air eliminator then it is being pre heated in preheater.
- 6.3.1.2 Plant steam enters in main column and pure steam is generated by evaporation of feed water.
- 6.3.1.3 10% to 15% purging is done to flush condensate steam from the main column.

6.4 Process Cycle:

- 6.4.1 PLC will show the readings of Temperature, Conductivity and pure steam pressure.
- 6.4.2 Once PSG cycle start from HMI Set Parameters are printed with interval of 10 minute.
- 6.4.3 Now Plant Steam valve will gets ON/OFF to achieve set plant steam temperature (NLT: 130°C).
- 6.4.4 After achieving Plant Steam Temperature set point, preheating time shall start to preheat.



Title: Operation of Pure Steam Generator System

SOP No.:		Revision No.:	00
Effective Date:		Supersedes No.	Nil
Review Date:		Page No.	3 of 10

- 6.4.5** During Preheating if temperature falls below Plant Steam Temperature set point, will reset Preheating ON time.
- 6.4.6** After achieving set Plant Steam Temperature Preheating ON time will start again Simultaneously PLC check GRC Water Level and GRC temperature.
- 6.4.7** During start up if GRC Water Level not reach to High Level.
- 6.4.8** Message will be display on HMI and print once during start up phase “WAIT FOR HIGH LEVEL”.
- 6.4.9** Once the High Level reach, this message will be ignore by system throughout the process, if during the process GRC LEVEL LOW level switch gets OFF, will cut off feed pump, it will start again once the GRC LEVEL LOW limit switch detect for 10sec (Fix).
- 6.4.10** Plant steam condensate drain valve will on if GRC temperature + 5 DEG C is below set value.
- 6.4.11** Feed Water to G.C. valve will ON if Water Level in GRC Column is less than GRC Level High.
- 6.4.12** Once high level reach in GRC column, High Level delay time will gets ON.
- 6.4.13** If GRC Water Level falls below High level in GRC column. Feed Water to G.C. valve gets ON again after completion of High Level delay time.
- 6.4.14** After completion of Preheating Time and High Level reach in GRC Column Feed Pump gets ON, Else remains OFF.
- 6.4.15** Set the Feed water flow rate 1/3 of the requirement. (Refer GA Drg. /Consumption data sheet on the plant.)
- 6.4.16** After certain period of time, Pure Steam starts to come out.
- 6.4.17** During the process water will accumulate in column, if column level input sense to PLC, after 5 sec, it will ON recirculation valve to GRC, this will operate for six times without considering GRC water level high, After six time recirculation one time purging valve gets ON (in case of manual valve operator needs open manually) and it will be on up to completion of purging time. (in case manual valve this time will ignore by logic)
- 6.4.18** Recirculation valve to GRC gets OFF after 5 Sec (Fix – to avoid throttle effect) once Level input gets OFF.
- 6.4.19** PLC will start purging fault off timer when feed pump is on and column level input is OFF.
- 6.4.20** If in between feed pump stops by any means of fault this timer will reset and will count further when feed pump will start again.



Title: Operation of Pure Steam Generator System

SOP No.:		Revision No.:	00
Effective Date:		Supersedes No.	Nil
Review Date:		Page No.	4 of 10

6.4.21 If during this time PLC will get input from column level sensor purging problem off timer will reset and restart and if column level sensor input not activated after completion of purging off timer.

6.4.22 Message display on HMI “PURGING OFF PROBLEM” with signal tower lamp indication.

6.4.23 Feed pump will stop by pressing ACK hooter will off and feed pump will start

6.4.24 Purging fault on timer will start when column level sensor input is on and reset with input gets OFF, if during this time purging fault on timer is completed

6.4.25 Message display on HMI “PURGING ON PROBLEM” with signal tower lamp indication.

6.4.26 Feed pump will stop by pressing ACK hooter will off and feed pump will start only after “Purging Time”

6.4.27 During the running cycle, when column Level input is on, in respective of GRC High level and divert condensate for six times.

6.4.28 Whenever stop button press from HMI during process run.

6.4.29 Message will be display on HMI and print “SHUTDOWN CYCLE ON”.

6.4.30 Feed Pump will stop after plant steam temperature reduces below set temperature.

6.4.31 Pure steam pressure reaches 0.2 bar then after Plant Steam Inlet Valve gets off.

6.4.32 When Plant steam temperature reaches below 105 °C, GRC drain and First Column Purging Valve will on.

6.4.33 Check GRC low level reach then after GRC drain time will start.

6.4.34 Completion of GRC drain time machine shutdown will complete.

6.4.35 Message will be display on HMI “PLANT READY TO START”.

6.5 Shutdown Procedure for 300 kg Pure Steam Generator in Manual Mode:

6.5.1 Close the Boiler Steam Stop Valve.

6.5.2 Switch OFF the Boiler Steam Valve from control panel.

6.5.3 Stop feed pump when boiler steam pressure found less than 2.0 kg/cm².

6.5.4 Wait till the water collected in the Column is drained.

6.5.5 Switch off main.

6.5.6 Record the operational details as per **Annexure-I**.

6.6 Set Parameter Details of HMI for pure steam generation operation:



Title: Operation of Pure Steam Generator System

SOP No.:		Revision No.:	00
Effective Date:		Supersedes No.	Nil
Review Date:		Page No.	5 of 10

Set Parameter Screen	
Pre Heating Time	60 Sec
Initial Hooter Off Time	60 Sec
Parameter Print Time	180 Min
Printing Time	0600sec
Parameter Print	Enable

Set Parameter 1 Screen	
Boiler Steam Temp. (Set)	143.0 °C
Boiler Steam Temp. (Low)	130.0 °C
F.W. Conductivity	1.30 µS/cm
Pure Steam Conductivity	01.00 µS/cm

Set Parameter 2 Screen	
Purging Time	10 Sec
Purging Fault On time	010 Min
Purging Fault Off time	030 Min

Set Parameter 3 Screen	
Pure Steam Pressure High	5.0 Kg/cm²
Pure Steam Pressure High Fault On Delay	0300 Sec
Pure Steam Pressure Low	02.0 Kg/cm²
Pure Steam Pressure Low Fault On Delay	0300 Sec

Set Parameter 4 Screen	
High Level Delay Time	010
GRC Drain Time	015
GRC Temperature	040.0 °C
Pure Steam Pressure Controlling Set Point	3.50 Kg/cm²



Title: Operation of Pure Steam Generator System

SOP No.:		Revision No.:	00
Effective Date:		Supersedes No.	Nil
Review Date:		Page No.	6 of 10

6.7 Alarm and controlling measure in PSG system

S.No.	Parameter	Control Action
1.	Air Pressure Low	All valve will close and Feed pump Stop.
2.	GRC Water Level low	Feed Pump will be Off.
3.	Boiler steam Temperature Low	Feed pump will be Stop.
4.	Feed water conductivity High	Feed Pump will stop and GRC to drain valve will open.
5.	Pure steam conductivity High	Alarm will show fault "Pure steam conduct High".
6.	Pure steam pressure High	Alarm will show fault "Pure steam Pressure High".
7.	Pure steam pressure Low	Alarm will show fault "Pure steam Pressure Low".
8.	Purging On Problem	Feed pump will stop.
9.	Purging OFF Problem	Feed pump will stop.
10.	Feed pump outlet Pressure Low	Feed Pump will stop.
11.	Feed Pump overload	Feed pump will stop.
12.	GRC temperature Low	Feed Pump will stop.

7.0 ANNEXURES:

ANNEXURE No.	TITLE OF ANNEXURE	FORMAT No.
Annexure-I	Pure Steam Generator Operation Record for 300 Kg	
Annexure-II	Pure Steam Generator Operation Record for 500 Kg	
Annexure-III	Pure Steam Distribution Flow Diagram – I Block	
Annexure-IV	Pure Steam Distribution Flow Diagram – A Block	

ENCLOSURES: SOP Training Record

8.0 DISTRIBUTION:

- Controlled Copy No. 01 Quality Assurance
- Controlled Copy No. 02 Engineering
- Master Copy Quality Assurance

9.0 REFERENCES:

Operation & Maintenance Manual of Pure Steam Generator.



PHARMA DEVILS

ENGINEERING DEPARTMENT

Title: Operation of Pure Steam Generator System

SOP No.:		Revision No.:	00
Effective Date:		Supersedes No.	Nil
Review Date:		Page No.	7 of 10

10.0 REVISION HISTORY:

CHANGE HISTORY LOG

Revision No.	Change Control no.	Details of Changes	Reason for Change	Effective Date	Updated By

