



PHARMA DEVILS

QUALITY ASSURANCE DEPARTMENT

FAT FOR PURE STEAM GENERATOR

**FACTORY ACCEPTANCE TEST
500 KG/HR AT 6 BAR PLANT STEAM
PRESSURE WITH
MITSUBISHI PLC + E-1061 HMI,
NCGR
FOR
PURE STEAM GENERATOR**



FAT FOR PURE STEAM GENERATOR

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1.0 SYSTEM INFORMATION:

Supplier	
Customer	
Site	
Proposed Installation Location	

2.0 DOCUMENT DETAILS:

Document Generated By	Name	Sign	Date	Revision
Document Approved By				

3.0 PROTOCOL APPROVAL FROM CUSTOMER:

Department	Name	Sign	Date
Production			
Engineering			
QA			
Consultant			



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4.0 OBJECTIVE:

To confirm, by physical inspection and testing, that the fabrication and assembly of the equipment and any auxiliary support systems, conforms to the Design parameters as per the Design Review.

5.0 SCOPE OF THIS DOCUMENT:

This Factory Acceptance Test (FAT) protocol is applicable to the Pure Steam Generator.

The tests shall be carried out at M/S

The verification of compliance to specifications as per DR documents and to GMP requirements
Shall be done by:

- Confirmation that all design Documents, specifications and test certificates are approved, available and accurate.
- Physical Inspection of the electrical hardware.
- Mechanical inspection of the construction of the equipment.
- Functional testing (including safety tests) of the equipment with printouts for tests that require supporting documentation.



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6.0 ACCEPTANCE CRITERIA:

- The design documents specifications and test certificates shall be approved and accurate.
- The electrical hardware shall comply with the approved design specifications.
- The individual tests performed shall conform to the agreed acceptance criteria.
- Any modifications if required are to be documented to suit the purpose at customer site if committed by vendor in D.R.

Any tests not performed (due to limitations of resources, complexity of the complete assembly of the equipment and complexity of the tests) during the FAT shall be performed during the OQ of the equipment at site and the SAT test report shall clearly indicate these tests.

If any deviations from the approved protocol occur or the user requests any changes these deviations shall be reviewed by the SAT execution team, agreed upon and then hand marked in the original protocol with initials and date.

All non-conformances shall be noted and corrective actions listed.

The vendor shall agree upon an action plan on the corrective actions with mutually agreed time frame.

The FAT may be repeated fully or in part (related to the deviation observed) depending upon the impact of the deviation.

7.0 RESPONSIBILITIES:

Approval of the Document

The heads of Engineering & QA shall approve the document and the results of the evaluation.

Inspection

Customer or their authorized representatives are responsible for the visit the Vendor's site and execution of the FAT based on this FAT document.

All documents shall be checked and approved by customer or their authorized representatives.

The vendor shall conduct all tests.



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8.0 ABBREVIATIONS:

ABBREVIATIONS	FULL FORM
PO	Purchase Order
MOC	Material Of Construction
PLC	Programmable Logic Controller
RPM	Rotations Per Minute
HP	Horse Power
T/C	Triclover
FAT	Factory Acceptance Test
ASME	American Society of Mechanical Engineers
MMI	Man Machine Interface
DP	Diaphragm
AV	Air vent
PG	Pressure Gauge
SV	Safety Valve
STU	Steam Trap Unit



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9.0 CHECK POINTS & TESTING:

LIST OF REFERENCE DOCUMENTS

Objective	To check the documents required for job as per checklist.
Material	Documents list submitted in the FAT.
Method	The Vendor shall present documents as listed in the “ List of Documents “. The submitted documents shall be checked for correct Documents No., version No., date and authorization details against the details submitted in the FAT Test form by the vendor
Acceptance Criteria	The documents submitted shall be as specified in the list of reference documents.

LIST OF DOCUMENTS:

- 1) List of the reference drawings
- 2) Material history chart with Test Certificates
- 3) Bought – out components
- 4) Components certification & calibration.
- 5) Dimensional report
- 6) Surface finish report
- 7) Hydrostatic Test Report
- 8) Operation Qualification Report
- 9) Steam Quality Test Report.
 - Non Condensable Test Report.
 - Dryness Fraction Test Report.
 - Degree of Superheat Test Report.



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LIST OF REFERENCE DOCUMENTS

S.No.	Title Of Document	Submittal Stage	Document No.	Remarks
1.	List of the reference drawings	FAT/IQ		
2.	Material history chart with Test Certificates	FAT/IQ		
3.	Bought – out components	FAT/IQ		
4.	Components certification & calibration.	FAT/IQ		
5.	Dimensional report	FAT/IQ		
6.	Surface finish report	FAT/IQ		
7.	Hydrostatic Test Report	IN-PROCESS		
8.	Operation Qualification Report	FAT/OQ		
9.	Steam Quality Test Report. a. Non Condensable Test Report. b. Dryness Faction Test Report. c. Degree of superheat Test report.	FAT/OQ		

Corrective action in case of Non Compliance		
Conclusions		
	Performed by	Checked by
Name		
Signature		
Date		



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10. Installation Qualification:

TABLE OF CONTENTS

Description
List Of Reference Drawings
Material History Chart
Bought –Out Components
Components Certification & Calibration
Dimensional Report
Surface Finish Report
PLC Input Output check Report (If applicable)



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LIST OF REFERENCE DRAWINGS

Objective	To check reference drawing required for job against list mention below.
Material	Approved drawings list submitted in the FAT/Final Document.
Method	The Vendor shall present all the drawings as listed in the “ List of Drawings “ The submitted Drawings shall be checked for correct Drawings No., version No., date and authorization details against the details submitted in the FAT Test form by the vendor. Record all the data on Form.
Acceptance Criteria	The drawings submitted shall be as specified in the list of reference drawing.

LIST OF DRAWINGS:

- 1) As built GA Drawing
- 2) P & I Diagram
- 3) Wiring Diagram
- 4) Pneumatic Diagram



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LIST OF REFERENCE DRAWINGS

S.No.	Title of Drawing	Submittal Stage	Drawing No.	Rev.	Remarks
1.	GA Drawing	FAT			
2.	P & I Diagram	FAT			
3.	Wiring Diagram	FAT			
4.	Pneumatic diagram	FAT			

Corrective action in case of Non Compliance		
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MATERIAL HISTORY CHART

Objective	To prove that the materials used for construction of components are as per the DR specification/ Approved drawing.
Material	Material test certificates.
Method	The Vendor shall present certificates for the materials listed in the “ Material History Chart “. The submitted certificates shall be checked for correct material usage against the details submitted in the DR, by the vendor.
Acceptance criteria	The certificates shall prove that the materials used for construction of components are as per the approved specifications.



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MATERIAL HISTORY CHART

S.No.	Part Description & Size	Acceptance Criteria		Result	Remarks
		Material	Certificate No.		
1.	Column Shell 12 SWG Sheet	ASTM A240M 316L			
2.	Condenser Shell 12 SWG Sheet	ASTM A240M 316L			
3.	Condenser Tubes 12.7 mm OD X 1 mm Thk.	ASME SA213 TP 316L			
4.	Gas Removal Column 12 SWG Sheet	ASTM A240M 316L			
5.	Gas cooler shell 4"ODX 14 SWG	SA 249 TP 316L			
6.	Gas cooler Tubes 12.7 MM OD X 1MM THK	SA213 TP316L			
7.	Pre heater Shell 3"ODX16SWG	AISI 304			
8.	Pre heater Tubes 12.7 mm OD X 1 mm Thk.	ASME SA 213 TP 316L			
9.	Sampling Pre heater Shell 3" OD X 16 SWG	SA 249 TP 316L			
10.	Sampling Pre heater Tubes 12.7 mm OD X 1 mm Thk.	SA 213 TP316L			
11.	Separator Fabrication 20 SWG SHEET	ASTM A240M 316L			

PIPE LINES

1.	Pure Steam Outlet 3" OD X 16 SWG	SA 249 TP 316L			
2.	Pure steam sampling line: 12.7mm X 1 mm Thk.	ASME SA213 TP 316L			
3.	Feed Water line ¾" OD X 16 SWG	SA 249 TP 316L			
4.	Boiler steam Line 2"NB SCH 40 ERW PIPE	AISI304			

GASKET

1.	MINI TC Gasket	SILICON			
2.	1/2" T/C Gasket	SILICON			
3.	1" T/C Gasket	SILICON			
4.	2" T/C Gasket	SILICON			
5.	3" T/C Gasket	SILICON			

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BOUGHT – OUT COMPONENTS

Objective	To prove that the Bought Out components used for construction of the equipment are as per the approved specifications.
Material	Bought Out components specification sheets (From the original manufacturer)
Method	<p>The Vendor shall present previously approved specification sheets for the Bought Out components listed in the “Bought Out components list “for review at the start of the FAT exercise.</p> <p>Inspect the installed component. Compare Quality Certificate of the component the make, Model No. and other specifications with the approved specifications.</p>
Acceptance criteria	The verification shall prove that the Bought Out components used for construction of the equipment is as per the approved specifications.



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BOUGHT – OUT COMPONENTS

S.No.	Component	Make	Certificate Type	Qty.
MECHANICAL COMPONENTS				
1.	Feed Pump	Grundfos	Test Certificate	01
2.	Variable Flow Indicator	Krohne Marshall	Test Certificate	01
3.	Pneumatic valve	Gemu	Test Certificate	05
4.	Plant Steam In valve	Shakti	Compliance Certificate	01
5.	Non return valve	Alfa Laval	Test Certificate	02
6.	Air regulator	Festo	Test Certificate	01
7.	Steam Trap	Spirax	Test Certificate	03
8.	Safety valve	Spirax	Test Certificate	01
9.	Pressure Gauge for Pure Steam	Waaree	Calibration Certificate	01
10.	Pressure Gauge for Boiler steam	Waaree	Calibration Certificate	01
11.	Pressure Gauge for Feed water	Waaree	Calibration Certificate	01
12.	Ball Valve	Shakti	Test Certificate	03
13.	Vent Filter	Pall	Compliance Certificate	01
14.	Air Pressure Regulator	Festo	Test Certificate	01
15.	Needle valve	Shakti	Test Certificate	02
16.	Diaphragm valve	Crane Process	Test Certificate	02
ELECTRICAL COMPONENTS				
1.	PLC	Mitsubhishi	Test Certificate	01
2.	Display	Mitsubhishi	Test Certificate	01 SET
3.	Conductivity Converter	Yokogawa	Calibration Certificate	01
4.	Conductivity Sensor	Yokogawa	Calibration Certificate	02
5.	Temperature Sensor	Radix	Calibration Certificate	03
6.	Pressure switch	Orion	Test Certificate	04
7.	Liquid level sensor	Pune Tectrol	Test Certificate	02
8.	Liquid level sensor	E+H	Compliance Certificate	01
9.	Pressure Transmitter	Jumo	Compliance Certificate	01

Corrective action in case of Non Compliance		
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COMPONENTS CERTIFICATION & CALIBRATION

Objective	To verify the Test certificates and Calibration certificates of the designated components.
Material	Test certificates and Calibration certificates of the designated components (From the original manufacturer or from a certified calibration laboratory)
Method	<ul style="list-style-type: none">• The Vendor shall present Test certificates and Calibration certificates of the designated components (From the original manufacturer or from a certified calibration laboratory) for verification.• Check whether the certificate corresponds to the installed component.• Compare the make, Model No. and other specifications from the certificate with the specifications of the component and in the table below.• National traceability certificate to be provided if committed in DR.
Acceptance criteria	The verification shall prove that the designated components used for construction of the equipment are properly tested / calibrated.



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COMPONENTS CERTIFICATION & CALIBRATION

S.No.	Component	Make	S.No. / ID No.	Certificate No.
MECHANICAL COMPONENTS				
1.	Feed Pump(CRN 3 -12) (MP1)	Grundfos		
2.	Variable area Indicator KM25-P 100–1000LPH At discharge side of Feed pump (FI1)	Krohne Marshall		
3.	Pneumatic valve DN 20 At column purging water line (PNA1)	Gemu		
4.	Pneumatic valve DN 20 At discharge of Feed Pump (PND3)	Gemu		
5.	Pneumatic Valve DN 20 At Feed Water In gas cooler (PND1)	Gemu		
6.	Plant Steam In valve 2”(50mm) At inlet of the plant steam (GV1)	Shakti		
7.	Non return valve DN 25 At the conductivity sampling line (NRV1)	Alfa Laval		
8.	Non return valve DN 25 At vacuum break line of GRC (NRV2)	Alfa Laval		
9.	Diaphragm valve DN025 At Feed Water Inlet to PSG Line (DP1)	Crane Process		
10.	Air regulator ¼” At the Inlet of the compressed air (APR1)	Festo		
11.	Steam Trap BPT-21,15 NB At First column air vent line (ST2)	Spirax		
12.	Steam Trap BPT-21,15 NB At Plant Steam Condensate Drain of PH1(ST3)	Spirax		
13.	Steam Trap FT-14CI-10 (c), 25 NB At Boiler Steam Condensate line of first condenser to Preheater PH2 (ST1)	Spirax		
14.	Safety valve (SV11) 75-125 PSI At inlet of the plant steam line (SV1)	Spirax		
15.	Pressure Gauge(0-16 Kg/cm2)At plant steam line (PG1)	Waaree		
16.	Pressure Gauge Glycerin filled (0-16 Kg/cm2) At discharge side of feed pump (PG2)	Waaree		
17.	Pressure Gauge with Siphon Coil (0-7 Kg/Cm2) At pure steam line (PG3)	Waaree		
18.	Manual ball Valve ¾” At plant steam condensate drain by pass to steam trap (BV1)	Shakti		
19.	Manual ball Valve ¾” At plant steam condensate drain through steam trap (BV2)	Shakti		
20.	Manual ball Valve ¾” At cooling water line for Sample taking preheater – HE2 (BV4)	Shakti		
21.	Needle valve ¾”At steam condensate drain line of PH2(NV2)	Shakti		
22.	Pneumatic Valve DN 15 At gas removal lie from gas cooler to atmosphere (PNA2)	Gemu		
23.	Pneumatic Valve DN 15At Drain Line of Gas Removal Column(PNA3)	Gemu		
24.	Disposable Vacuum Break filter KA1PFRP1 At top of GRC (VF1)	Pall		
25.	Needle valve ¾” At cooling water line for conductivity (NV1)	Shakti		
26.	Diaphragm valve DN 025 At the sample taking line (DP2)	Crane Process		

ELECTRICAL COMPONENTS



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S.No.	Component	Make	S.No. / ID No.	Certificate No.
1.	PLC: FX1N 24MT-ESS FX2N 4AD	Mitsubhishi		
2.	MMI: E1061	Mitsubhishi		
3.	Temperature Transmitter: TX1DR	Radix		
4.	Conductivity Meter	Yokogawa		
5.	Conductivity Sensor (0o C – 110o C) At inlet of machine (CS1)	Yokogawa		
6.	Conductivity Sensor (0o C – 110o C)At Pure Steam Condensate Sampling Point (CS2)	Yokogawa		
7.	Temperature Sensor(0°C to 200° C) Boiler steam line (TS1)	Radix		
8.	Temperature Sensor (0°C to 200°C)Pure Steam Line (TS2)	Radix		
9.	Temperature sensor at Gas removal column assembly (0° C to 200°C) At Feed Water Inlet Line to Gas removal column (TS3)	Radix		
10.	Pressure Transmitter (-1 to 5 Bar G)Pure Steam Line (PT1)	Jumo		
11.	Sanitary Pressure switch 1 -15 Bar Feed Pump Outlet Line (PS2)	Orion		
12.	Pressure switch 0.5 - 7.0 Bar At air pressure line (PS4)	Orion		
13.	Sanitary Pressure switch 0.5-7.0 Bar Pure Steam Line (PS3)	Orion		
14.	Sanitary Pressure switch 0.2-2.6 Bar At the inlet side of feed water (PS1)	Orion		
15.	Liquid Level sensor FLT-20H On column (LS1)	E+H		
16.	Liquid level Sensor at Gas removal column Assembly At Gas removal column (LSL)	Pune Techtrol		
17.	Liquid level Sensor at Gas removal column Assembly At Gas removal column (LSH)	Pune Techtrol		

Corrective action in case of Non Compliance		
Conclusions		
	Performed by	Checked by
Name		
Signature		
Date		



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DIMENSIONAL MEASUREMENTS

Objective	Dimension check against Approved GA Drawings.
Instruments	Measure Tape 0 - 3000 mm, Vernier Caliper 0 - 300 mm,
Method	Direct measurement of Overall dimensions, Connection Points. Install the plant on the suitable place. Measure the indicated dimensions and fill in the dimension report.
Acceptance Criteria	All the measured dimensions shall be within the dimensional tolerances.

DIMENSION CHECKS:

OVERALL DIMENSION:

HEIGHT (H), LENGTH (L), WIDTH (W)

UTILITY CONNECTIONS CHECKS:

CHECK DIMENSION AGAINST GA DRAWING.



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DIMENSIONAL MEASUREMENTS

S.No.	Parameter	Value from Drawing (mm)	Actual Value (mm)	Conclusion
1.	Overall height H			
2.	Overall Width W			
3.	Overall Depth D			
4.	Pure Steam Outlet Height			

UTILITY CONNECTION POINTS CHECKS

S.No.	Description	Value from GA Drawing (mm)	Actual Value (mm)	Corresponding/ Non corresponding
1.	Boiler steam inlet	2" ASA 150# Flange		
2.	Compressed air inlet	½" BSP (F) Thread		
3.	Header Drain	1 ½" BSP (F) Thread		
4.	Drain Header air vent	1" BSP (F) Thread		
5.	Pure steam outlet	3" Triclover		
6.	Feed water inlet	1" Triclover		

Corrective action in case of Non Compliance		
Conclusions		
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SURFACE FINISH TESTS

Objective	To check the surface finish of the surface of the plant and to verify against the approved drawing requirement.
Instruments	Surface Finish Tester (Mitutoyo Surface Test Kit Sj-301)
Method	<p>Check the Surface Finish of the product contact surface with the calibrated Roughness Tester according to the instrument manual.</p> <p>Wipe dry the surfaces using a moist cloth and check for any fibers getting caught by the surface rubbed.</p> <p>Measure the indicated surfaces at 3 different points.</p> <p>Results shall be recorded.</p>
Acceptance Criteria	All the surfaces tested shall meet the requirements.



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Surfaces:

Ra Test:

S.No.	Surface	Checking Point	Accessibility limit ($\mu\text{m R}_A$)	No of measurements	Actual Value ($\mu\text{m R}_A$)	Conclusion
1.	Column Shell	1	≤ 0.60	1		
		2		1		
		3		1		
2.	Condenser	1	≤ 0.60	1		
		2		1		
		3		1		
3.	Sampling Pre Heater	1	≤ 0.60	1		
		2		1		
		3		1		
4.	Gas Cooler	1	≤ 0.60	1		
		2		1		
		3		1		
5.	Gas Removal column	1	≤ 0.60	1		
		2		1		
		3		1		

Corrective action in case of Non Compliance		
Conclusions		
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PLC INPUT OUTPUT CHECK (IF APPLICABLE)

Objective	To check the Input Output and to verify against the wiring diagram requirement.
Method	Check the input output against wiring diagram visually during operation. Results shall be recorded.
Acceptance Criteria	All the Input and output shall meet the requirements.

TEST TO BE CARRIED OUT & PROCEDURE	ACCEPTANCE CRITERION	RESULTS (PASS/FAIL) WITH SIGN
Check the input output against wiring diagram visually during operation.	All the Input and output shall meet the requirements.	

Corrective action in case of Non Compliance		
Conclusions		
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Name		
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11. Operational Qualification:

HYDROSTATIC TEST

Objective	To qualify the welding quality in view of Leak-tightness under Hydraulic pressured condition as per the ASME Sec. VIII Div.1 (2010) code and qualifying the vessel to operate at specified design condition.
Material	Water
Utilities	Water supply, Hydraulic pumps , compressed air
Instruments	Air vent valve, Pressure Gauge
Method	<ol style="list-style-type: none">1. Prepare the tank for the shell hydro test Fill the Shell side or jacket side/ coil/ tube side parts for which weld joints are to be tested with water. Blind off all nozzles,2. Fit the PG with vent valve on top nozzle.3. Connect Hydraulic pump to nozzle.4. When water flows out of vent, close the vent valve and develop pressure by pump till PG shows reading at specified Hydro-test pressure.5. Mark the Pressure on the pressure gauge and check the same after 30 minutes.6. Check all weld joints & temporary / permanent joints for leakage. Check the internal surface critically for deformity. <p>Record all the data on Hydrostatic Test Report</p>
Acceptance criteria	No pressure drop or leakage from any joint at specified Hydro test pressure within 30 minutes of observation. No deformation of the inside surface.



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HYDROSTATIC TEST

Hydrostatic Test

Time for test 30 min/each

Part	Pressure in Kg/cm ²		Expected result	Observed Result
	At the Start of Test	At the End of Test		
Column	9		No leakage & No pressure drop	
Condenser	9		No leakage & No pressure drop	
Gas Removal Column	9		No leakage & No pressure drop	
Gas Cooler	9		No leakage & No pressure drop	
Pre heater-1	9		No leakage & No pressure drop	
Pre heater-2	9		No leakage & No pressure drop	
Sampling Preheater-1	9		No leakage & No pressure drop	
Sampling Preheater-2	9		No leakage & No pressure drop	
Pipe Lines (Air Test)	7		No leakage & No pressure drop	

Corrective action in case of Non Compliance		
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CYCLE OPERATION (RUNNING TRIAL)

Objective	To carry out plant running trial for observing performance/operation of all the items this are installed on the plant.
Method	Perform the operations as indicated in form.
Acceptance Criteria	1. (Refer attached Form).



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CYCLE OPERATION (RUNNING TRIAL)

S.No.	TEST TO BE CARRIED OUT & PROCEDURE	ACCEPTANCE CRITERION	RESULTS (PASS/ FAIL) WITH SIGN
1.	EMERGENCY STOP		
	Press Emergency Stop	Check the display which shows fault "EMERGENCY STOP" and Feed pump will stop and all valve will OFF.	
	Release Emergency Stop	Check display, it shows "PROCESS OK" and Feed pump and All Valves will ON.	
2.	AIR PRESSURE LOW		
	Set the air pressure switch at higher value than actual air pressure from pressure switch value,	Now check on the display, which show fault "AIR PRESSURE LOW " & All Valves will OFF but GRC to drain valve (Normally open valve) will be ON.	
	Set Air pressure switch at lower value than actual air pressure from pressure switch value,	Now check on the display, which shows "PROCESS OK "& All valves will ON.	
3.	GRC WATER LEVEL LOW		
	Stop Air supply given to Feed Water to GC Valve	After some time check on the display which show fault "GRC WATER LVL LOW" and Feed Pump, Feed Water in PSG Valve will be Stop.	
	Give Air supply to Pneumatic Feed Water to GC Valve	After some time check on the displays which show "PROCESS OK" and Feed Pump & Feed Water in PSG valve will be ON after achieving high level in the GRC.	
4.	BOILER STEAM TEMPERATURE LOW		
	Close Plant Steam in PSG Valve & wait till the Boiler steam temperature decrease below set temperature.	Check on the display it will show "BOI. STEAM TEMP. LOW "& Feed Water in PSG Valve and Feed pump will be OFF and purging valve become ON.	
	Open Plant Steam in PSG Valve & wait till the Boiler steam temperature increase up to set temperature	Check on the display it will show "PROCESS OK " and Feed Water in PSG Valve and Feed pump will be ON and purging valve become OFF.	
5.	FEED WATER CONDUCTIVITY HIGH		
	Decrease the set parameter value (5microsim /cm) then existing conductivity	Check on display which will show alarm "F.W. CONDUCT. HIGH" and Feed pump will stop and Drain valve will be ON.	
	Increase the set parameter value (5microsim /cm) then existing conductivity	Check on display which will show "PROCESS OK" and Feed Pump will start and Drain valve will be OFF.	
6.	PURE STEAM CONDUCTIVITY HIGH		
	Decrease the set parameter value (1microsim /cm) then existing conductivity	Check on display which will show alarm "PURE STEAM CONDUCT. HIGH"	
	Increase the set parameter value (1microsim /cm) then existing conductivity	Check on display which will show "PROCESS OK"	
7.	FEED WATER PRESSURE LOW		
	Turn pressure setting knob clock-wise to set pressure more than actual pressure, till relay of pressure switch gets OFF	Check the display which show "F.W. PRESSURE LOW	
	Turn pressure setting knob Anti-clock-wise to set pressure less than actual pressure, till relay of pressure switch gets ON.	Check the display which shows "PROCESS OK ".	



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S.No.	TEST TO BE CARRIED OUT & PROCEDURE	ACCEPTANCE CRITERION	RESULTS (PASS/ FAIL) WITH SIGN
8.	PURE STEAM PRESSURE HIGH		
	Close the pure steam outlet valve & let the pure steam pressure be increased higher than the set pressure for Pure steam pressure high delay time parameter	Check on display which will show "PURE STEAM PRESSURE HIGH" & Feed Water in PSG Valve and Feed pump will OFF.	
	check on display which will show "PURE STEAM PRESSURE HIGH" & Feed Water in PSG Valve and Feed pump will OFF.	Now let the pressure be decrease till the pure steam pressure is reached to the, pure steam set pressure for the pure steam lower pressure. As soon as the set lower pressure is reached, Feed Water in PSG Valve and Feed pump will ON.	
9.	PURE STEAM PRESSURE LOW		
	Open the pure steam outlet valve & let the pure steam pressure be decrease lower than the set pressure for Pure steam pressure low delay time parameter	Check on display which will show "PURE STEAM PRESSURE LOW".	
	Close the pure steam outlet valve to release the pure steam pressure. As soon as pressure increase higher than the set pressure for the pure steam low pressure parameter	Now let the pressure be increase till the pure steam pressure is reached to the, pure steam set pressure for the pure steam higher pressure. Display shows "PROCESS OK" As soon as the set higher pressure is reached.	
10.	PURGING ON PROBLEM		
	Stop Air supply given to pneumatic Purging valve	Increase Feed water flow rate. Allow water to accumulate in column till it reaches to level sensor (float switch). Wait for set parameter Purging fault ON time (Ensure that this stage will remain continuously) displays show "PURGING ON PROBLEM" with buzzer & Feed water in PSG valve and Feed pump will OFF.	
	Give Air supply to Pneumatic Purging Valve. Now Water will be drained out.	Check the displays which show "PROCESS OK". Purging valve will close after purging time set parameter. If we press ACK during fault condition Feed Water in PSG Valve will remain OFF. Only after draining out water Feed water in PSG Valve and Feed pump will ON.	
11.	PURGING OFF PROBLEM		
	Decrease Feed water flow rates. Also keep pneumatic Purging valve open manually by turning manual operating screw of solenoid valve wait Purging fault OFF time (settable parameter) (Ensure that this stage will remain continuously for set time & water should not reach to level sensor in column)	Display will show "PURGING OFF PROBLEM" & Feed water in PSG valve and Feed pump will OFF.	
	Increase Feed water flow rate & keep pneumatic Purging valve in auto operation. Ensure that water should reach up to level sensor. Purging valve will close after purging time set parameter. If we press ACK during fault condition Feed water in PSG valve and Feed pump will start	Display shows "PROCESS OK" even if water level is till high & again fault will generate after same purging fault OFF timer.	
12.	FEED PUMP OVER LOAD		
	While pump is running give link between 24VDC and Feed Pump O/L i/p, Immediately feed pump will stops automatically	Check the display which shows "FEED PUMP O/L".	
	Now Again remove link between them. As soon as contact of relay gets on Feed pump will starts automatically	Check the display which shows the "PROCESS OK".	



PHARMA DEVILS

QUALITY ASSURANCE DEPARTMENT

FAT FOR PURE STEAM GENERATOR

S.No.	TEST TO BE CARRIED OUT & PROCEDURE	ACCEPTANCE CRITERION	RESULTS (PASS/ FAIL) WITH SIGN
13.	INSUFF.FEED WATER		
	Turn pressure setting knob clock-wise to set pressure more than actual pressure, till relay of pressure switch gets OFF	Check the display which shows "INSUFF. FEED WATER"	
	Turn pressure setting knob Anti-clock-wise to set pressure less than actual pressure, till relay of pressure switch gets ON	Check the display which shows "PROCESS OK".	
14.	POWER FAILURE		
	Switch OFF main panel entire panel will off	Cycle will stop.	
	Switch ON main panel	Now check on the print, which show "POWER FAIL". After Power ON Process will start from same phase from where it is interrupted.	



PHARMA DEVILS

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FAT FOR PURE STEAM GENERATOR

INTER LOCKING

A.	FEED WATER VALVE IN PSG	Boiler Steam Temperature Low	
		GRC Water Level Low	
		Pure Steam Pressure High	
		Purging On Problem	
		Purging Off Problem	
		Air Pressure Low	
		Emergency Stop	
		High Level Delay time.	
		Feed Water Conductivity high	
B.	PURGING VALVE	Boiler Steam Temperature Low	
		Column Water Level High	
		Purging Time	
C.	FEED WATER TO G.C VALVE	Air Pressure Low	
		GRC Water Level High	
		Emergency Stop	
D.	GRC TO GC VALVE	Air Pressure low	
		Emergency Stop	
		Process stop	
E.	GRC TO DRAIN VALVE	Feed water conductivity High	

Corrective action in case of Non Compliance		
Conclusion		
	Performed by	Checked by
Name		
Signature		
Date		



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FAT FOR PURE STEAM GENERATOR

OPERATION SEQUENCE TEST REPORT

Objective	To carry out plant Operation sequence for observing performance/operation of all the items this are installed on the plant.
Method	Perform the operations sequence as indicated in manual.
Acceptance Criteria	(Refer attached Form).

OPERATION SEQUENCE TEST REPORT

S.No.	TEST TO BE CARRIED OUT & PROCEDURE	ACCEPTANCE CRITERION	RESULTS (PASS/FAIL) WITH SIGN
1.	Check operation sequence according to procedure given in operation and maintenance manual.	As specified in Operation and Maintenance manual.	

Corrective action in case of Non Compliance		
Conclusion		
	Performed by	Checked by
Name		
Signature		
Date		

STEAM QUALITY TEST REPORT

Objective	To carry out test of steam quality test.
Method	Perform the test according to EN285.
Acceptance Criteria	(Refer attached Form).

STEAM QUALITY TEST REPORT

S.No.	TEST TO BE CARRIED OUT	ACCEPTANCE CRITERION	RESULTS (PASS/ FAIL) WITH SIGN
1.	Non Condensable Test Report.	It should not more than 3.5 %	
2.	Dryness Fraction Test Report.	It should not less then 0.9	
3.	Degree of Superheat Test Report.	The degrees of super heat measured in free steam at atmospheric pressure shell not exceed 25° C	



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FAT FOR PURE STEAM GENERATOR

Corrective action in case of Non Compliance		
Conclusion		
	Performed by	Checked by
Name		
Signature		
Date		

12. FAT REPORT:

Summary of the results obtained :

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Significant deviations observed:

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PHARMA DEVILS

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FAT FOR PURE STEAM GENERATOR

13. FAT REPORT APPROVAL:

Remarks: Approved/Not Approved

Department	Name	Signature	Date
FOR M/s			
Production			
Engineering			
QA			
Consultant			
FOR M/s.....			
Service			