

GUJARAT GAS

**FACTORY ACCEPTANCE TEST PROCEDURE
FOR
NATURAL GAS FILTRATION & PRESSURE REDUCTION SKID**

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Technical Committee (PE-PNG)			
Approved By			



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1 PREFACE

1.1 INTRODUCTION :

This document defines procedure for Factory acceptance Test (FAT) to be carried out for Filtration & Pressure Reduction skid. The purpose of carrying out FAT is to inspect and check the skid, fit for use purpose and desired functionality of entire Skid with respect to agreed technical documents.

1.2 SCOPE :

The FAT will confirm the compliance of IPRS/CPRS/DRS with the specifications.

All the equipment's / instruments/ items shall be installed (as far as possible) for functionality demonstration during FAT. In case some of the items cannot be erected/ installed during FAT, list of such item along with the reason for not installing the same shall be provided before start of FAT. Final procedure with vendor recommendation shall be prepared by vendor and submitted to GGL for review.

1.3 REFERENCE DOCUMENTS:

A) FOR _____ SCM:

Design Documents		DOCUMENT No.
1	P & ID	
2	GA Drawing – skid and filter	
3	Base frame and Foundation Drawing	
4	Canopy Drawing (wherever applicable)	
5	Painting datasheet	
Datasheet / Drawing of Equipment's:		
6	Active Pressure Regulating Valve	
7	Monitor Pressure Control Valve	
8	Slam Shut off valve	
9	Pressure Safety valve	
10	Creep Relief Valve	
11	Cartridge Filter	

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B) COMMON DOCUMENTS :

Design Documents		DOCUMENT No.
1	Quality assurance plan - Mechanical Items	
2	Quality assurance plan-Instrumentation Equipment	
3	Material Test certificate, Radiography test report, Hydrostatic-test certificate	
4	Functional design specification and Operation control logic	
Datasheet / Drawing of Equipments:		
5	Pressure Gauge	
6	Differential Pressure Gauge	
7	Temperature Gauge	
8	Ball Valves	
9	Check Valves	
10	Globe Valve	

1.4 ORIENTATION WITNESSES:

All Representatives shall be briefed on operating principles of the Filtration & Pressure Regulating Skid package before commencing the FAT.

1.5 TEST CERTIFICATES:

Upon completion of the tests mentioned in this document, Test Certificate should be filled with the results and signed/stamped by representatives of all the parties-VENDOR and TPI/Client

2 VISUAL INSPECTION OF SKID**2.1 SKID REVIEW:**

The skid will be inspected for installation of all the components as per approved P&ID and G.A. Drawing and other related documents listed in section 1.3. Dimensional checking shall be done as per approved G.A. drawing. The Skid will be inspected for proper support with rubber pads/ clamps for the major equipment/ Instruments and pipes, Blinds (for Drains/ Vent / End Flange), Jumpers Platforms, crossovers .etc.,

Stud & nuts with minimum 2 to 3 threads shall fall beyond the nut on both sides,

Copper jumper plate on each flange joint.



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2.2 TEST CERTIFICATE FOR VISUAL INSPECTION :

Upon completion of the visual inspection described in this section, the Test Certificate for Visual Inspection of skid should be dully filled and signed by both parties.

3 FACTORY ACCEPTANCE TEST

3.1 PNEUMATIC LEAK TEST:

Pneumatic leak test is carried out on completely erected skid using compressed air.

- 1) Keep all valves open. Close either inlet or outlet side pipe with blind flange.
- 2) Check all drain and vents are in closed position and safety valve inlets and intermediate line ball valves are in open condition.
- 3) Charged air at 1 Barg from inlet.
- 4) Slowly increase the pressure by steps of 1 Barg up to 7 Barg.
- 5) Inspect all flanged and threaded joints using soap water for 30 minutes and also inspect for any leakage in all Isolation Valve (Ball, Plug, Globe valves)/ control valve gland, joints, connections, impulse tubing or any other connection or any other part of skid. In case the leakage from skid or its part is noticed, the same shall be attended and corrected.

3.2 PRESSURE SAFETY VALVE:

Functional testing of Pressure safety valve shall be carried out at bench by taking-offline. Set points should be checked according to FAT Report attached at the end of this document.

3.3 PRESSURE REGULATION SYSTEM:

This Section describes the procedure for checking the working of SSV, Pressure Regulators & CRV. However, final procedure with vendor recommendation shall be prepared by vendor and submitted to GGL for review.

Set points of all Pressure Regulators should be checked according to FAT Report attached at the end of this document.

- 1) Close outlet ball valves of pressure regulation system.
- 2) Open inlet ball valve of main pressure regulation system.
- 3) Pressurizing will make upstream pressure of SSV to an inlet pressure which is higher than the



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- PRV set pressure so that simulation can be done.
- 4) Check the set point of each regulator. If required reset the set points and lock it. Record the set points in report.
 - 5) SSV Limit switches feedback signal shall be checked for continuity by multimeter.
 - 6) Changeover of Stream shall be demonstrated.
 - 7) Functional test is to be performed in order to provide evidence that equipment is in working order. Functional tests are to be performed to ensure the continuity of supply of gas and/or to prevent system over pressurization.
 - 8) Sequence of pressure setting for regulating devices of stream in skid during functional test is given below:
 - 9) Pressure setting is started from;

1st	-	SSV
2nd	-	CRV
3rd	-	Monitor-PRV
4th	-	Active-PRV
 - 10) Following steps are to be performed at factory location to carry out the functional test of skid.

Functional Test:-

- 1) Functional test of each stream should be carried out by safe venting of gas from venting line of each stream.
- 2) For functional test of current standby line, isolate the downstream by closing the outlet valve. Ensure current working line is functioning during testing.
- 3) For functional test of current working line, isolate the downstream by closing the outlet valve. Ensure the standby line which was converted as working stream is opened and functioning during testing.

Before starting functionality test of SSV ensure-

- Fully open both PRVs (Active & Monitor) & full tight the nut of CRV to fail CRV which makes bypass for setting of SSV.
- Functional test of SSV, CRV and PRVs in line order to be done as per steps given below.

Functional test of SSV:-

- 1) Make the PRV-A & PRV-M full tight (Max. downstream pressure) allow to pressure increased for functional checking of SSV at set pressure.
- 2) Slowly increase the line pressure by adjusting pilot valve of Monitor PRV till line pressure reaches at the predefined set pressure of SSV.
- 3) Adjust SSV pilot valve for tripping on set point.
- 4) If SSV is tripped at set point then lock the nut of SSV pilot.
- 5) Reset SSV that was tripped for further operation.
- 6) To ensure functionality repeat steps 4 and 5 for 2-3 times.



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Functional test of CRV:-

- 1) After setting of SSV, slowly reduce the line pressure through pilot valve of Monitor PRV till line pressure reaches the set point of CRV. Adjust the CRV till gas starts slowly passing from venting line at the set point.
- 2) Lock the CRV nut at set point of pressure.
- 3) Reduce pressure after resetting CRV.
- 4) Increase pressure repeat to observe functionality.

Functional test of Monitor-PRV:-

- 1) After setting of CRV, slowly reduce the line pressure through pilot valve of Monitor-PRV till line pressure reaches the set point of Monitor PRV.
- 2) When pressure is set on set point of Monitor-PRV then lock the nut of pilot valve.

Functional test of Active-PRV:-

- 1) After setting of Monitor-PRV, slowly reduce the line pressure through pilot valve of Active-PRV till line pressure reaches at the set point of Active-PRV.
- 2) When pressure is set on set point of Active-PRV then lock the nut of pilot valve.
- 3) Follow the safety norms as applicable during the carried out functional test of IPRS/DRS/CPRS.
- 4) So during functional test, both current working and standby stream shall be checked. Both streams should be functioning on predefined pressure set point.

All equipment (i.e. SSV, regulator, monitor and CRV) should perform in accordance with the pre-defined control logic in sequential manner and smooth stream discrimination.

All trunion mounted ball valve should undergo for double block and bleed test.

4 PAINTING :

Painting shall be checked as per Painting procedure, Document No. -

5 DOCUMENTS REVIEW :

After completion of all tests, Documents like material test certificates, Radiography test, Hydro - test certificate for pipe spools, calibration/ test reports etc. for Ball valves, PSV/CRV, SSV and PCV etc. shall be reviewed as per approved QAP for the equipments / instruments. Calibration reports for PG, TG and DPG shall be reviewed.

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TEST CERTIFICATE

VISUAL INSPECTION

Project NATURAL GAS FILTRATION & PRESSURE REDUCTION SKID.

Customer M/S. GUJARAT GAS LTD.

PO. NO.

System No. --

Sr.No	POINTS INSPECTED	FOUND OK
1	Skid checked as per P & ID and GA Drawing	YES / NO.
2	Process parameter in Name Plate	YES / NO.
3	Lifting Hook	YES / NO.
4	Copper jumper plate for all flanges	YES / NO.
5	Earthing Connection at base frame	YES / NO.
6	Identification Tags for all Instruments	YES / NO.
7	Painting colors as per Painting Spec.	YES / NO.
8	Spares as per P.O. requirement	YES / NO.
9	Foundation bolt and Matching flanges	YES / NO.
10	Support for all the equipments/ Instruments, Pipes	YES / NO.
11	Rubber sheet between pipe and support	YES / NO.
12	U clamps with PVC cover	YES / NO.
13	Adequacy of approach for operation & maintenance	YES / NO.
14	Thread projection of stud beyond nut	YES / NO.
15	Lock open facility of PSV & CRV	YES / NO.
16	Proper alignment of pipe including piping for PG, TG, Vent, etc.	YES / NO.
17	Locking facility in below 2" valve	YES / NO.
18	Vent assembly with brass flapper at 45 degree	YES / NO.
19	Welded and threaded joints as per the GGL PMS	YES / NO.
20	Pasted Laminated P&ID inside the canopy (A2 size)	YES / NO.
21	Calibration tags on the instruments (PG, DPG, TG, PSV, CRV etc.)	YES / NO.



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22	Two copper Earthing strip from skid flange to base frame/	YES / NO.
23	Glass window in canopy for PG, DPG , TG and meter	YES / NO.
24	Square metal sheet provided at all the opening for the pipe (inlet, outlet, drain, vent etc.)	YES / NO.
25	Sealing of the canopy joints by sealant jelly	YES / NO.
26	Canopy doors shall be foldable type with Aldrop type locking system.	YES / NO.
27	Doors shall open fully on either sides and shall be lockable from inside & outside. Check locks availability	YES / NO.
28	All accessories in the canopy provided of SS-304 material (Hinges. Locks, Stud, Nuts , Handles etc.)	YES / NO.

 Vendor

 TPIA

 Customer

Representative

Representative

DATE:



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TEST CERTIFICATE

DIMENSIONAL INSPECTION

Project NATURAL GAS FILTRATION & PRESSURE REDUCTION SKID.

Customer M/S. GUJARAT GAS LTD.

PO. NO.

System No. —

Sr.No.	POINTS INSPECTED	FOUND OK
1	Base Frame Dimension As per Foundation drawing	YES / NO
2	Height of inlet pipe from base in mm _____	YES / NO
3	Height of Outlet pipe from base in mm _____	YES / NO
4	Painting thickness of pipe line as per approved Specifications	YES / NO
5	Length of cabinet/canopy	YES / NO

Vendor

TPIA

Customer

Representative

Representative

DATE:



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TEST CERTIFICATE

HYDRO-TEST REVIEW

Project NATURAL GAS FILTRATION & PRESSURE REDUCTION SKID.

Customer M/S. GUJARAT GAS LTD.

PO. NO.

System No. --

Sr.No.	POINTS INSPECTED	FOUND OK
1	TPIA Inspection Reports for Hydro-Test for Pipe spools of valves, as per hydrotest procedure.	YES / NO

Vendor

TPIA

Customer

Representative

Representative

DATE:

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TEST CERTIFICATE

LEAKAGE TEST OF COMPLETE SKID

Project NATURAL GAS FILTRATION & PRESSURE REDUCTION SKID.

Customer M/S. GUJARAT GAS LTD.

PO. NO.

System No. --

Test Pressure: 7.0 Barg.

Test Media : Air

Duration : 30 minutes

Sr.No.	POINTS INSPECTED	FOUND OK
1	LEAK TEST AT FLANGE JOINTS AND OTHER CONNECTIONS	YES / NO

Vendor

TPIA

Customer

Representative

Representative

DATE:



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TEST CERTIFICATE

FUNCTIONAL TEST OF PRESSURE REGULATION SYSTEM

Project NATURAL GAS FILTRATION & PRESSURE REDUCTION SKID.

Customer M/S. GUJARAT GAS LTD.

PO. NO.

System No. --

FAT CHECK LIST

ITEM	INSPECTION	SET PRESSURE (Barg)	CHECKED	REMARKS
1	Set Point of PCVA-101		Accepted /Rejected	
2	Set Point of PCVA-102		Accepted /Rejected	
3	Set Point of PCVM-101		Accepted /Rejected	
4	Set Point of SSV-101		Accepted /Rejected	
5	Set Point of PCVM-102		Accepted / Rejected	
6	Set Point of SSV -102		Accepted /Rejected	
7	Set Point of CRV-101		Accepted / Rejected	
8	Set Point of CRV-102		Accepted / Rejected	
9	Set Point of PSV-101.		Accepted / Rejected	
10	Set Point of PSV-102		Accepted / Rejected	
11	Limit switch continuity check		Accepted / Rejected	

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Customer

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REVIEW OF DOCUMENTS

Project NATURAL GAS FILTRATION & PRESSURE REDUCTION SKID.

Customer M/S. GUJARAT GAS LTD.

PO. NO.

System No. --

Sr.No	INSPECTION	CHECKED	REMARKS
1.	Radiography Test Reports as per Approved QAP	Accepted Rejected	
2.	Dye Penetration Test as per Approved QAP	Accepted Rejected	
3	Test Certificate for Slam Shut valves, Pressure Regulator (PCV), PSV, CRV, NRV, Isolation Ball Valves, Globe Valve, Check Valve, Coalescing filter, PG, TG, pipe spools, canopy etc.	Accepted Rejected	
4	Hydro test Report for Pipe spools & for items as per Approved QAP.	Accepted Rejected	
5	Material test Report as per Approved QAP	Accepted Rejected	
6	Calibration Report for PG, TG, DPG, PSV, CRV, Test report for SSV, PCV.	Accepted Rejected	
7	Welding Procedure Specification, Welder qualification.	Accepted Rejected	
8	Compliance Certification for Painting of skid including all items (Filtration system, PRS, Valves, PSVs, CRVs etc).	Accepted Rejected	
9	Material Correlation Chart & Welding Joints Correlation Chart	Accepted Rejected	

Vendor

TPIA

Customer

Representative

Representative

DATE:

FAT Procedure for filtration and pressure reduction skid

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ACTION LIST

Project NATURAL GAS FILTRATION & PRESSURE REDUCTION SKID.

Customer M/S. GUJARAT GAS LTD.

PO. NO.

System No. --

Sr. No.	Description	Action By
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		

Vendor

TPIA

Customer

Representative

Representative

DATE:

Vignesh R