PROJECT SPECIFICATION PROCESS DESIGN DATA SPDC GAS PLANT FACILITIES	CONTRACT No. E-02398	CONTRACT DOC. No. 81-SD-P-0561-Z1	
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	PREP'D	K. KOBAYASHI	
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	APP'D	H. KONISHI	

PROCESS DESIGN DATA FOR LP FLASH GAS COMPRESSION

FOR

LNG GAS SUPPLY PROJECT

AS BUILT

JGC / SAIPEM CONSORTIUM

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A1	13 DEC '99	ALL	ISSUED FOR COMMENT	K.Kobayashi	-	H. KONISHI
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LGSP PJ. 0-0001	
DIST	SECTION
2	SPDC
	SYO
	PD
	DPD
	PM
	EM
	YAMA
	MORI
	AKI
	NELSON
	LGSPC/F
	PCM
	PPM
	CE
	PROC. 1-1
	PROC. 1-2
	PROC. 2-1
	PROC. 2-2
	LOGISTIC
	EXPEDITE
	Q/A
	Q/C
	HSES
	MATECON
	PROCESS
	PIPING
	CIVIL
	ELEC
	INST
	CONT ENG
	ROTARY
	FIRE
	BUILD'G
	EQUIPMENT
	PACKAGE
	S.H.
	INS/PAINT
	FURNACE
	OPERATION
	METAL'ST
	SAIPEM
	SPIE
1	SOC
	VENDORS
1	YOS

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1.0 INTRODUCTION

1.1 General

The function of the LP Flash Gas Compression system is to compress the excess LP flash gas from 3.5 bar(a) to 7.5 bar(a) and then the compressed gas is fed to AG/Flash Gas Compression system to reduce off-gas flaring at Soku Gas Plant.

2.0 PROCESS DESCRIPTION

Refer to PFS No. D-00-1223-006
D-00-1223-071
PEFS Nos. D-56-1225-101
D-56-1225-102
D-56-1225-103

The LP Flash Gas Compression system compresses the excess off-gas from LP Flash Drums V-5103/5203 to reduce flaring at Soku Gas Plant. The off-gas is compressed from 3.5 bar(a) to 7.5 bar(a) and then fed to the AG/Flash Gas Compression system for onward mixing with the NAG entering the gas dehydration system.
The operation of the gas plant is not dependent on the availability of this LP Flash Gas Compression system. If the LP Flash Gas Compression system is "down", the excess off-gas will be flared via the pressure control valves downstream of V-5103/5203.

2.1 Process data

Basic process data for compressor design are shown below.

		CASE 1	CASE 3	CASE 5a
Flowrate	kg/s	1.815	1.755	0.406
Actual intake capacity	dm^3/s	298.9	272.2	75.3
Inlet press	Bara	3.5	3.5	3.5
Discharge press	Bara	7.5	7.5	7.5
Inlet temp	°C	41.9	43.0	47.7
MW at inlet		43.5	46.1	39.7
Cp/Cv at inelt		1.1401	1.1339	1.1458
Cp at inlet	kJ/kgK	1.827	1.827	1.868
Z		0.9569	0.9516	0.9669

Compoment	MW	CASE 1 (mol %)	CASE 3	CASE 5a
H_2O	18	2.19	2.32	2.94
N_2	28	6.82E-04	4.42E-04	1.70E-03
CO_2	44	3.82E-01	2.71E-01	1.99E-01
C_1	16	21.27	15.91	34.25
C_2	30	13.55	12.20	16.73
C_3	44	26.55	27.95	13.09
$_iC_4$	58	7.99	8.58	6.74
$_nC_4$	58	13.74	16.72	7.82
$_iC_5$	72	4.67	5.60	5.23
$_nC_5$	72	3.87	4.92	4.19
C_6+		5.79	5.53	8.81
Total		100.00	100.00	100.00

Note. Case1:Max. flowrate, Case3:Max. MW, Case5a:Min. MW

2.2 Selection of compressor type

The type selection of compressor mainly depends on its capacity and compression ratio. According to the above process data and operation condition, the following characteristic are pointed out:

- Actual intake capacity (75-300 dm^3/s) is small.
- Compression ratio (2.2) is low.
- Continuous operation is necessary.

Sundyne compressor seems to be most suitable for small flow capacity and relatively low compression ratio. Moreover, its size is very compact.

2.3 Modification of instrument and control

The pressure control on LP flash gas header will be modified so as to give LP fuel gas system whatever it requires and the pressure controller 69PICA-005 located on LP fuel gas header will control a balance of the LP flash gas to the compressor and LP fuel gas system.

The logic controller of the new LP compressor can be installed in the current control room, however, some mimic panels must be modified due to the change of pressure control system.

3.0 PROCESS CONTROL

The excess off-gas fed to the LP Flash Gas Compression system is controlled by the pressure controller located on LP fuel gas header to keep demand for LP fuel gas.

The capacity of the LP Flash Gas Compression system is controlled by anti-surge controller.

4.0 MAINTENANCE SHUTDOWN

The LP flash gas compression system can be individually isolated, depressured to the HP flare, drained down to the closed drain system and purged with nitrogen. It is ensured that sufficient connections are available for this to be carried out easily and in a safe manner.

For maintenance shutdown, the compression system can be isolated by closing the upstream and downstream isolation valves. Depressuring of the line is achieved by opening the blowdown valves to the HP flare. Any residual liquid will be drained to the closed drain system. Residual gas is purged to the HP flare header with nitrogen. The blowdown connection is then closed and the purge continued to atmosphere via the vent connection.

5.0 START-UP

During initial start-up, the LP flash gas compression system may be pressurised from LP flash gas header that is already pressurised and under operation.

First, manual block valves located on LP flash gas header and AG/Flash gas compression suction header are opened. Then the shutdown valves located upstream of the suction scrubber V-5601 and downstream of the discharge scrubber V-5602 are opened and the isolation valve located upstream of V-5601 are opened. The system is pressurised up to the outlet isolation valve located downstream of V-5602.

The LP flash gas compressor is then started on recycle until the compressors run up to the discharge pressure of 7.5 bar(a). The outlet isolation valve is then opened.

6.0 PERFORMANCE REQUIREMENTS

The following are the minimum performance requirements for the LP flash gas compression system:

- The LP flash gas compression system shall be capable of compressing the excess off-gas from the LP condensate flash drums with total flowrate of 8.54×10^4 m^3(std)/d (3.0 MMscf/d), from 3.5 bar(a) to 7.5 bar(a).

- The compression systems shall be designed to handle the above Standard Volumetric flowrate throughout the compositional range as shown on 2.1 Process Data.

- The capacity control of the LP flash gas compression system shall allow the system to operate between 0% to 100% of design flow rate.

- The compressors shall be capable of operating on continuous 100% recycle.

7.0 CRITICAL DESIGN ASPECTS

The following critical design aspects have been reviewed during conceptual design:

- A sensitivity study has confirmed that the change of MW and flowrate from case 1 to case 5 as specified in 2.1 Process Data does not introduce any severe problems.
- Studies have shown that Sundyne compressor is most suitable for small flowrate and relatively low compression ration.
- Dedicated anti-surge system is required.

8.0 REFERENCES

1.	Doc. No. D-00-1222-001	Design Basis.
2.	Doc.No. 1763-ST-P-001	Isolation Philosophy.
3.	Doc.No. 1763-ST-P-002	Process Control Philosophy.
4.	Doc. No. 1763-ST-P-003	ESD Philosophy.
5.	Doc.No. 1763-TN-P-016	Material Study.
6.	Doc.No. 1763-TN-M-003	Analysis of Compression Options.
7.	Doc. No. S-00-1221-001	Material Selection Report.