طرح نگهداشت و افزایش تولید 27 مخزن

CHEMICAL CONSUMPTION LIST

نگهداشت و افزایش تولید میدان نفتی بینک

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D03	AUG.2023	IFA	M.Aryafar	M.Fakharian	A.M.Mohseni	
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Status:

IDC: Inter-Discipline Check
IFC: Issued For Comment
IFA: Issued For Approval
AFD: Approved For Design
AFC: Approved For Construction
AFP: Approved For Purchase
AFQ: Approved For Quotation
IFI: Issued For Information
AB-R: As-Built for CLIENT Review
AB-A: As-Built –Approved

REVISION RECORD SHEET

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CONTENTS

1.0 INTRODUCTION

Binak oilfield in Bushehr province is a part of the southern oilfields of Iran, is located 20 km northwest of Genaveh city.

With the aim of increasing production of oil from Binak oilfield, an EPC/EPD Project has been defined by NIOC/NISOC and awarded to Petro Iran Development Company (PEDCO). Also PEDCO (as General Contractor) has assigned the EPC-packages of the Project to "Hirgan Energy - Design and Inspection" JV.

As a part of the Project, a New Gas Compressor Station (adjacent to existing Binak GCS) shall be constructed to gather of 15 MMSCFD (approx.) associated gases and compress & transfer them to Siahmakan GIS.

GENERAL DEFINITION

The following terms shall be used in this document.

CLIENT:	National Iranian South Oilfields Company (NISOC)
PROJECT:	Binak Oilfield Development – Surface Facilities; New Gas Compressor Station
EPD/EPC CONTRACTOR (GC):	Petro Iran Development Company (PEDCO)
EPC CONTRACTOR:	Joint Venture of : Hirgan Energy – Design & Inspection (D&I) Companies
VENDOR:	The firm or person who will fabricate the equipment or material.
EXECUTOR:	Executor is the party which carries out all or part of construction and/or commissioning for the project.
THIRD PARTY INSPECTOR (TPI):	The firm appointed by EPD/EPC CONTRACTOR (GC) and approved by CLIENT (in writing) for the inspection of goods.
SHALL:	Is used where a provision is mandatory.
SHOULD:	Is used where a provision is advisory only.
WILL:	Is normally used in connection with the action by CLIENT rather than by an EPC/EPD CONTRACTOR, supplier or VENDOR.
MAY:	Is used where a provision is completely discretionary.

2.0 SCOPE

This document defines process design basis for Binak Compressor Station to process sour gas from Golkhari booster/cluster and Binak production unit with cumulative rate of 15 MMSCFD. The new compressors will be added “future” section of existing Binak compressor station plant.

3.0 NORMATIVE REFERENCES

3.1 CODES AND STANDARDS

Not Applicable.

3.2 THE PROJECT DOCUMENTS

- BK-GNRAL-PEDCO-000-PR-DB-0001 Process Basis Of Design
- BK-GNRAL-PEDCO-000-PR-DC-0001 Process Design Criteria
- BK-PPL-PEDCO-320-PR-PI-0001 P&ID - Gas Pipeline (to Siahmakan G.I. Station)
- BK-GCS-PEDCO-120-PR-PF-0001 Process Flow Diagram (PFD)
- BK-GCS-PEDCO-120-PR-UF-0001 Utility Flow Diagrams (UFD)
- BK-GCS-PEDCO-120-PR-PI-0002~0025 P&IDs

3.3 ENVIRONMENTAL DATA

Refer to "Process Basis of Design; Doc. No. BK-GNRAL-PEDCO-000-PR-DB-0001".

3.4 ORDER OF PRECEDENCE

In case of any conflict between the contents of this document or any discrepancy between this document and other project documents or reference standards, this issue must be reported to the CLIENT. The final decision in this situation will be made by CLIENT.

4.0 CHEMICAL CONSUMPTION LIST

4.1 CORROSION INHIBITOR

Refer to Process Flow Diagram and Utility Flow Diagram corrosion inhibitor injection is required for gas pipelines to manage corrosion due to H_2S and CO_2 in presence of water. Reported gas composition in the process flow diagram should be delivered to Vendors (chemical supplier) to determine required injection rate.

The corrosion inhibitor injection package has been calculated as following:

As per chemical supplier (Attachment 1):

Table 1 - Corrosion Inhibitor Consumption

Injection Point	Flowrate (lit/hr) Win/Summ			Operating Pre. (barg)	Continuous / Intermittent	Notes
	Min.	Max.	Rated			
Gas Pipeline Pig Launcher (PL-3201)	0.021/0.02	0.059/0.058	0.059/0.058	50.92	Continuous	1,2,4
Gas Discharge Drum Outlet (V-2103)	0.021	0.059	0.059	53.9	Continuous	1,2,4
Gas Pig Receiver Outlet (PR-1002)	0.021	0.021	0.021	7.5	Continuous	1,3,4
Gas Pig Receiver Outlet (PR-2002)	0.040	0.040	0.040	7.5	Continuous	1,3,4
Fuel Gas K.O. Drum (V-2205)	0.002	0.002	0.002	4.9	Continuous	1,3,4
Inlet K.O. Drum Outlet (V-2105)	0.061	0.061	0.061	5.1	Continuous	1,3,4
Slug Catcher Drum Outlet (V-2104)	0.040	0.040	0.0.040	5.3	Continuous	1,3,4

Notes:

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1) Gas corrosion inhibitor injection rates are considered as 0.1 lit/day for gas compressor station lines with assumption of making 70% (fuel oil) - 30% (corrosion inhibitor) solution.

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2) Assumption High Pressure Injection:
The summer consumption of Gas Corrosion inhibitor has been considered as injection to outlet of Gas Discharge Drum (V-2103) and injection to Gas Pipeline Pig Launcher (PL-3201).
V-2103: 14.10 MMSCFD
PL-3201: 14.03 MMSCFD
Total Feed: 14.10+14.03=28.13 MMSCFD

Total corrosion inhibitor injection : ((0.1*28.13)/24))=0.1172 lit/hr
Total Diesel Consumption: 0.1172 lit/hr * 7/3= 0.273 lit/hr
Q Total = 0.273 + 0.1172= 0.391 lit/hr

The winter consumption of Gas Corrosion inhibitor has been considered as injection to outlet of Gas Discharge Drum (V-2103) and injection to Gas Pipeline Pig Launcher (PL-3201).
V-2103: 14.13 MMSCFD
PL-3201: 14.07 MMSCFD
Total Feed: 14.13+14.07=28.2 MMSCFD
Total corrosion inhibitor injection : ((0.1*28.2)/24))=0.1175 lit/hr
Total Diesel Consumption: 0.1175 lit/hr * 7/3= 0.274 lit/hr
Q Total = 0.274 + 0.1175= 0.392 lit/hr

Corrosion Inhibitor Package Pumps (High Pressure) P-2207A/B:
Normal Flow Rate: 0.392 lit/hr
Design Flow Rate (20%) : 0.470 lit/hr

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3) Assumption Low Pressure Injection:

The summer consumption of Gas Corrosion inhibitor has been considered as injection to outlet of Gas Pig Receiver (PR-1002), injection to outlet of Gas Pig Receiver (PR-2102), injection to Fuel Gas K.O. Drum (V-2205) and injection to inlet of K.O. Drum Outlet (V-2105).
PR-1002: 4.92 MMSCFD
PR-2002: 9.53 MMSCFD
V-2205: 0.41 MMSCFD
V-2105: 14.6 MMSCFD
V-2104: 9.6 MMSCFD
Total Feed: 4.92 + 9.53 + 0.41 + 14.6 + 9.6 = 39.06 MMSCFD
Total corrosion inhibitor injection : (((0.1*39.06)/24))=0.163 lit/hr
Total Diesel Consumption: 0163 lit/hr * 7/3= 0.376 lit/hr
Q Total = 0.376 + 0.163= 0.543 lit/hr

The winter consumption of Gas Corrosion inhibitor has been considered as injection to outlet of Gas Pig Receiver (PR-1002), injection to outlet of Gas Pig Receiver (PR-2102), injection to Fuel Gas K.O. Drum (V-2205) and injection to inlet of K.O. Drum Outlet (V-2105).
PR-1002: 5.00 MMSCFD
PR-2102: 9.6 MMSCFD
V-2205: 0.47 MMSCFD
V-2105: 14.6 MMSCFD
V-2104: 9.6 MMSCFD
Total Feed: 5 + 9.6 + 0.47 + 14.6 + 9.6 = 39.27 MMSCFD
Total corrosion inhibitor injection :((0.1*39.27)/24))=0.164 lit/hr
Total Diesel Consumption: 0164 lit/hr * 7/3= 0.382 lit/hr
Q Total = 0.382 + 0.164= 0.545 lit/hr

Corrosion Inhibitor Package Pumps (Low Pressure) P-2207C/D:

Normal Flow Rate: 0.545 lit/hr
Design Flow Rate (20%) : 0.655 lit/hr
Tank Sizing (Vertical):
Total Flow Rate: 0.655 + 0.470 = 0.937 lit/hr
Total Flow Rate : 0.001 m3/hr
Storage Time : 7 day
Tank Diameter : 0.8 m
Tank Height : 1.0 m
Tank Working Capacity : 0.2 m3
Tank Nominal Capacity : 0.5 m3

first filling of this package is in the scope of this contractor ,based on the corrosion inhibitor vendor's proposal and detailed design engineering calculation.

According to similar projects, it is possible that the Corrosion Inhibitor efficency is less than vendor's proposal.

Due to the possibility of replacing corrosion inhibitor materials in the next stages of operation and the possibility of increasing the amount of injection so this contractor calculates Corrosion Inhibitor Package based on last expreince projects:

The corrosion inhibitor injection package has been calculated as following:

As per contractor experience:

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Table 2 - Corrosion Inhibitor Consumption

Injection Point	Flowrate (lit/hr) Win/Summ			Operating Pre. (barg)	Continuous / Intermittent	Notes
	Min.	Max.	Rated			
Gas Pipeline Pig Launcher (PL-3201)	0.105/0.104	0.299/0.298	0.299/0.298	50.92	Continuous	1,2,4
Gas Discharge Drum Outlet (V-2103)	0.300	0.105	0.300	53.9	Continuous	1,2,4
Gas Pig Receiver Outlet (PR-1002)	0.106/0.105	0.106/0.105	0.106	7.5	Continuous	1,3,4
Gas Pig Receiver Outlet (PR-2002)	0.204/0.202	0.204/0.202	0.204	7.5	Continuous	1,3,4
Fuel Gas K.O. Drum (V-2205)	0.010/0.009	0.010/0.009	0.010	4.9	Continuous	1,3,4
Inlet K.O. Drum Outlet (V-2105)	0.310	0.310	0.310	5.1	Continuous	1,3,4
Slug Catcher Drum Outlet (V-2104)	0.204	0.204	0.204	5.3	Continuous	1,3,4

Notes:

1) Gas corrosion inhibitor injection rates are considered as 0.51 lit/day for gas compressor station lines with assumption of making 70% (fuel oil) - 30% (corrosion inhibitor) solution.

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2) Assumption High Pressure Injection:

The summer consumption of Gas Corrosion inhibitor has been considered as injection to outlet of Gas Discharge Drum (V-2103) and injection to Gas Pipeline Pig Launcher (PL-3201).
V-2103: 14.10 MMSCFD
PL-3201: 14.03 MMSCFD
Total Feed: 14.10+14.03=28.13 MMSCFD
Total corrosion inhibitor injection : ((0.51*28.13)/24))=0.6 lit/hr
Total Diesel Consumption: 0.6 lit/hr * 7/3= 1.4 lit/hr
Q Total = 0.6 + 1.4= 2.0 lit/hr

The winter consumption of Gas Corrosion inhibitor has been considered as injection to outlet of Gas Discharge Drum (V-2103) and injection to Gas Pipeline Pig Launcher (PL-3201).
V-2103: 14.13 MMSCFD
PL-3201: 14.07 MMSCFD
Total Feed: 14.13+14.07=28.2 MMSCFD
Total corrosion inhibitor injection : ((0.51*28.2)/24))=0.6 lit/hr
Total Diesel Consumption: 0.6 lit/hr * 7/3= 1.4 lit/hr
Q Total = 0.6 + 1.4= 2.0 lit/hr

Corrosion Inhibitor Package Pumps (High Pressure) P-2207A/B:
Normal Flow Rate: 2.0 lit/hr
Design Flow Rate (20%) : 2.4 lit/hr

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3) Assumption Low Pressure Injection:

The summer consumption of Gas Corrosion inhibitor has been considered as injection to outlet of Gas Pig Receiver (PR-1002), injection to outlet of Gas Pig Receiver (PR-2102), injection to Fuel Gas K.O. Drum (V-2205) and injection to inlet of K.O. Drum Outlet (V-2105).
PR-1002: 4.92 MMSCFD
PR-2002: 9.53 MMSCFD
V-2205: 0.41 MMSCFD
V-2105: 14.6 MMSCFD
V-2104: 9.6 MMSCFD
Total Feed: 4.92 + 9.53 + 0.41 + 14.6 + 9.6 = 39.06 MMSCFD
Total corrosion inhibitor injection : (((0.51*39.06)/24))=0.83 lit/hr
Total Diesel Consumption: 0.83 lit/hr * 7/3= 1.93 lit/hr
Q Total = 0.83 + 1.93= 2.76 lit/hr

The winter consumption of Gas Corrosion inhibitor has been considered as injection to outlet of Gas Pig Receiver (PR-1002), injection to outlet of Gas Pig Receiver (PR-2102), injection to Fuel Gas K.O. Drum (V-2205) and injection to inlet of K.O. Drum Outlet (V-2105).

PR-1002: 5.00 MMSCFD
PR-2102: 9.6 MMSCFD
V-2205: 0.47 MMSCFD
V-2105: 14.6 MMSCFD
V-2104: 9.6 MMSCFD
Total Feed: 5 + 9.6 + 0.47 + 14.6 + 9.6 = 39.27 MMSCFD
Total corrosion inhibitor injection :((0.51*39.27)/24))=0.83 lit/hr
Total Diesel Consumption: 0.83 lit/hr * 7/3= 1.93 lit/hr
Q Total = 0.83 + 1.93= 2.76 lit/hr

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Corrosion Inhibitor Package Pumps (Low Pressure) P-2207C/D:
Normal Flow Rate: 2.76 lit/hr
Design Flow Rate (20%) : 3.3 lit/hr

Tank Sizing (Vertical):
Total Flow Rate: 2.76 + 2.0 = 4.76 lit/hr
Total Flow Rate : 0.005 m3/hr
Storage Time : 7 day
Tank Diameter : 1.0 m
Tank Height : 1.3 m
Tank Working Capacity : 0.8 m3
Tank Nominal Capacity : 1.0 m3

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4.2 CONCLUSION:

According to above calculation, Low pressure (P-2207 C/D), High Pressure (P-2207A/B) and corrosion inhibitor tank (TK-2207) is considered in detailed design engineering calculation as below:

Corrosion Inhibitor Package Pumps (High Pressure) P-2207A/B:
Design Flow Rate (20%) : 2.4 lit/hr

Corrosion Inhibitor Package Pumps (Low Pressure) P-2207C/D:
Design Flow Rate (20%) : 3.3 lit/hr

Tank Sizing (Vertical):
Total Flow Rate: 2.76 + 2.0 = 4.76 lit/hr
Total Flow Rate : 0.005 m3/hr
Storage Time : 7 day
Tank Diameter : 1.0 m
Tank Height : 1.3 m
Tank Working Capacity : 0.8 m3
Tank Nominal Capacity : 1.0 m3

4.3 METHANOL INJECTION

Refer to Process Flow Diagram and Utility Flow Diagram methanol injection is required for gas

pipelines to prevent formation of hydration. Reported gas composition in the PFD should be delivered to Vendors (chemical supplier) to determine required injection rate.

The methanol injection package has been considered as part of design where its design, including injection rate, should be finalized after clarification with chemical supplier.

Table 2 - Methanol Injection Consumption

Injection Point	Flowrate (lit/hr)			Continuous / Intermittent	Notes
	Min.	Max.	Rated		
Gas Discharge Drum Outlet (V-2102A/B/C)	12.632	-	15.159	Intermittent	-
Gas Discharge 2nd Stage Gas Compression Air Cooler (AE-2102A/B/C)	35.834	-	43.0	Intermittent	2
Gas Discharge Drum Outlet (V-2103)	44.433	-	53.319	Intermittent	3
Dehydration Package Outlet (PK-2101)	50.208	-	60.249	Intermittent	4
Gas Pipeline	12.528	-	15.033	Intermittent	5

Notes:

1) Assumption:
The Maximum consumption of low pressure Methanol has been considered for the BDV-2131 A/B/C of Composite Gas Discharge 2nd Stage Gas Compression Suction DRUM (V-2102A/B/C)
Maximum consumption for (BDV-2131A/B/C) = 5.819 kg/h
Mass density of Methanol =767.8 kg/m3
((5.819 *1000)/767.8)= 7.579 lit/hr
Total: 7.58 lit/hr *2 =15.159

2) Assumption:

The Maximum consumption of high pressure Methanol has been considered for the BDV-2132 A/B/C of Composite Gas Discharge 2nd Stage Gas Compression Air Cooler (AE-2102A/B/C)
Maximum consumption for (BDV-2132A/B/C) = 16.508 kg/h
Mass density of Methanol =767.8 kg/m3
((16.508 *1000)/767.8)= 21.5 lit/hr
Total: 21.5 lit/hr *2 =43.0

3) Assumption:
The Maximum consumption of high pressure Methanol has been considered for the BDV-2141 of Composite Gas Discharge Drum Outlet (V-2103)
Maximum consumption for (BDV-2141) = 40.938 kg/h
Mass density of Methanol =767.8 kg/m3

((40.938 *1000)/767.8)= 53.319 lit/hr
Total: 53.319 lit/hr

4) Assumption:

The Maximum consumption of high pressure Methanol has been considered for the BDV-2151 of Composite Gas Dehydration Package Outlet (PK-2101)
Maximum consumption for (BDV-2151) = 46.259 kg/h
Mass density of Methanol =767.8 kg/m^3
((46.259 *1000)/767.8)= 60.249 lit/hr
Total: 60.249 lit/hr

5) Methanol consumption calculation for injection to 8" pipeline have been study based on pipeline hydrate formation study.

Methanol will be injected between 9.618 ~11.542 kg/hr. (Max flow when (PK-2101) is not in service, Max flow when destination pressure is 40 barg and (PK-2101) is not in service.
Maximum ((11.542*1000)/767.8)=15.033 lit/hr
Minimum (9.618*1000)/767.8=12.528 lit/hr

Note: Considering that the maximum amount of methanol consumption is 60.249 lit/hr , while the existing pump (X-4704P-1A) is working with capacity of 101 lit/hr, this amount is acceptable.