|  |
| --- |
| **طرح نگهداشت و افزایش تولید 27 مخزن** |
| **PROCESS SIMULATION REPORT****نگهداشت و افزایش تولید میدان نفتی بینک** |
| D05 | Oct. 2022 | AFD | M.Aryafar | M.Fakharian | M.Mehrshad |  |
| D04 | Aug. 2022 | IFA | M.Aryafar | M.Fakharian | M.Mehrshad |  |
| D03 | MAR. 2022 | IFA | M.Aryafar | M.Fakharian | M.Mehrshad |  |
| D02 | JAN. 2022 | IFA | M.Aryafar | M.Fakharian | M.Mehrshad |  |
| D01 | NOV. 2021 | IFA | M.Aryafar | M.Fakharian | M.Mehrshad |  |
| D00 | OCT. 2021 | IFC | M.Aryafar | M.Fakharian | Sh.Ghalikar |  |
| **Rev.** | **Date** | **Purpose of Issue/Status** | **Prepared by:** | **Checked by:** | **Approved by:** | **CLIENT Approval** |
| **Class:2** | **CLIENT Doc. Number:** **'F0Z-708817** |
| **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**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **PAGE** | **D00** | **D01** | **D02** | **D03** | **D04** | **D05** |  | **PAGE** | **D00** | **D01** | **D02** | **D03** | **D04** |
| **1** | X | X | X | X | X | X | **66** |  |  |  |  |  |
| **2** | X | X | X | X | X | X | **67** |  |  |  |  |  |
| **3** | X | X |  |  |  |  | **68** |  |  |  |  |  |
| **4** | X |  |  |  |  |  | **69** |  |  |  |  |  |
| **5** | X |  | X | X |  |  | **70** |  |  |  |  |  |
| **6** | X | X | X | X |  |  | **71** |  |  |  |  |  |
| **7** | X | X | X |  |  |  | **72** |  |  |  |  |  |
| **8** | X |  |  |  | X |  | **73** |  |  |  |  |  |
| **9** | X |  |  |  | X |  | **74** |  |  |  |  |  |
| **10** | X |  |  |  |  |  | **75** |  |  |  |  |  |
| **11** |  |  |  |  |  |  | **76** |  |  |  |  |  |
| **12** |  |  |  |  |  |  | **77** |  |  |  |  |  |
| **13** |  |  |  |  |  |  | **78** |  |  |  |  |  |
| **14** |  |  |  |  |  |  | **79** |  |  |  |  |  |
| **15** |  |  |  |  |  |  | **80** |  |  |  |  |  |
| **16** |  |  |  |  |  |  | **81** |  |  |  |  |  |
| **17** |  |  |  |  |  |  | **82** |  |  |  |  |  |
| **18** |  |  |  |  |  |  | **83** |  |  |  |  |  |
| **19** |  |  |  |  |  |  | **84** |  |  |  |  |  |
| **20** |  |  |  |  |  |  | **85** |  |  |  |  |  |
| **21** |  |  |  |  |  |  | **86** |  |  |  |  |  |
| **22** |  |  |  |  |  |  | **87** |  |  |  |  |  |
| **23** |  |  |  |  |  |  | **88** |  |  |  |  |  |
| **24** |  |  |  |  |  |  | **89** |  |  |  |  |  |
| **25** |  |  |  |  |  |  | **90** |  |  |  |  |  |
| **26** |  |  |  |  |  |  | **91** |  |  |  |  |  |
| **27** |  |  |  |  |  |  | **92** |  |  |  |  |  |
| **28** |  |  |  |  |  |  | **93** |  |  |  |  |  |
| **29** |  |  |  |  |  |  | **94** |  |  |  |  |  |
| **30** |  |  |  |  |  |  | **95** |  |  |  |  |  |
| **31** |  |  |  |  |  |  | **96** |  |  |  |  |  |
| **32** |  |  |  |  |  |  | **97** |  |  |  |  |  |
| **33** |  |  |  |  |  |  | **98** |  |  |  |  |  |
| **34** |  |  |  |  |  |  | **99** |  |  |  |  |  |
| **35** |  |  |  |  |  |  | **100** |  |  |  |  |  |
| **36** |  |  |  |  |  |  | **101** |  |  |  |  |  |
| **37** |  |  |  |  |  |  | **102** |  |  |  |  |  |
| **38** |  |  |  |  |  |  | **103** |  |  |  |  |  |
| **39** |  |  |  |  |  |  | **104** |  |  |  |  |  |
| **40** |  |  |  |  |  |  | **105** |  |  |  |  |  |
| **41** |  |  |  |  |  |  | **106** |  |  |  |  |  |
| **42** |  |  |  |  |  |  | **107** |  |  |  |  |  |
| **43** |  |  |  |  |  |  | **108** |  |  |  |  |  |
| **44** |  |  |  |  |  |  | **109** |  |  |  |  |  |
| **45** |  |  |  |  |  |  | **110** |  |  |  |  |  |
| **46** |  |  |  |  |  |  | **111** |  |  |  |  |  |
| **47** |  |  |  |  |  |  | **112** |  |  |  |  |  |
| **48** |  |  |  |  |  |  | **113** |  |  |  |  |  |
| **49** |  |  |  |  |  |  | **114** |  |  |  |  |  |
| **50** |  |  |  |  |  |  | **115** |  |  |  |  |  |
| **51** |  |  |  |  |  |  | **116** |  |  |  |  |  |
| **52** |  |  |  |  |  |  | **117** |  |  |  |  |  |
| **53** |  |  |  |  |  |  | **118** |  |  |  |  |  |
| **54** |  |  |  |  |  |  | **119** |  |  |  |  |  |
| **55** |  |  |  |  |  |  | **120** |  |  |  |  |  |
| **56** |  |  |  |  |  |  | **121** |  |  |  |  |  |
| **57** |  |  |  |  |  |  | **122** |  |  |  |  |  |
| **58** |  |  |  |  |  |  | **123** |  |  |  |  |  |
| **59** |  |  |  |  |  |  | **124** |  |  |  |  |  |
| **60** |  |  |  |  |  |  | **125** |  |  |  |  |  |
| **61** |  |  |  |  |  |  | **126** |  |  |  |  |  |
| **62** |  |  |  |  |  |  | **127** |  |  |  |  |  |
| **63** |  |  |  |  |  |  | **128** |  |  |  |  |  |
| **64** |  |  |  |  |  |  | **129** |  |  |  |  |  |
| **65** |  |  |  |  |  |  | **130** |  |  |  |  |  |

**CONTENTS**

[1.0 INTRODUCTION 4](#_Toc115263570)

[2.0 Scope 5](#_Toc115263571)

[3.0 NORMATIVE REFERENCES 5](#_Toc115263572)

[3.1 Codes and Standards 5](#_Toc115263573)

[3.2 The Project Documents 5](#_Toc115263574)

[3.3 ENVIRONMENTAL DATA 5](#_Toc115263575)

[4.0 FEED GAS SPECIFICATION 6](#_Toc115263576)

[5.0 DESIGN ASSUMPTIONS 7](#_Toc115263577)

[6.0 SIMULATION SOFTWARE 7](#_Toc115263578)

[6.1 Thermo-physical Properties prediction Methods 7](#_Toc115263579)

[7.0 SIMULATION result 8](#_Toc115263580)

[*ATTACHMENT I: HYSYS REPORT SUMMER CASE* 8](#_Toc115263581)

[*ATTACHMENT 2: HYSYS REPORT WINTER CASE* 8](#_Toc115263582)

1. **INTRODUCTION**

Binak oilfield in Bushehr province is a part of the southern oilfields of Iran, is located 25 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. |

1. **Scope**

The purpose of this document is to present design data and assumptions used to perform process simulations and results of simulation for different operating cases, namely summer and winter cases in normal operating capacities of the BINAK New Gas Compressor.

1. **NORMATIVE REFERENCES**

## Codes and Standards

The process design of the gas compression station shall comply with the latest versions of the international codes and standards from the following bodies (where applicable):

IPS Iranian Petroleum Standards

API American Petroleum Institute

ANSI American National Standards Institute

ASME American Society of Mechanical Engineers

ISA Instrument Society of America

ISO International Standards Organisation

NACE National Association of Corrosion Engineers

NFPA National Fire Protection Association

OSHA Occupational Safety and Health Act

TEMA Tubular Exchangers Manufacturer’s Association

## The Project Documents

* BK-GNRAL-PEDCO-000-PR-DB-0001 Process Basis of Design
* BK-GNRAL-PEDCO-000-PR-DC-0001 Process Design Criteria

## ENVIRONMENTAL DATA

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

1. **FEED GAS SPECIFICATION**

Table No.1 indicates feed composition, temperature, pressure and available flow for use in design of compressor station based on "Process Basis of Design; Doc. No. BK-GNRAL-PEDCO-000-PR-DB-0001".

**Table No.1: Binak Compressor Station Feed Composition (Saturated with Water)**

|  |  |  |
| --- | --- | --- |
| **Components** | **GOLKHARI** | **Binak** |
| **(Mol. %) in Summer** | **(Mol. %) in Winter** | **(Mol. %) in Summer** | **(Mol. %) in Winter** |
| H2O | 0.743 | 0.274 | 1.584 | 0.543 |
| CO2 | 3.008 | 2.962 | 3.454 | 1.672 |
| H2S | 6.770 | 6.184 | 2.805 | 1.867 |
| Methane | 67.253 | 71.690 | 57.439 | 78.373 |
| Ethane | 11.862 | 11.200 | 17.378 | 11.855 |
| Propane | 6.264 | 5.007 | 10.549 | 4.219 |
| i-Butane | 0.615 | 0.429 | 1.269 | 0.328 |
| n-Butane | 1.300 | 0.868 | 2.932 | 0.708 |
| i-Pentane | 0.665 | 0.399 | 0.758 | 0.129 |
| n-Pentane | 0.318 | 0.180 | 0.492 | 0.079 |
| n-Hexane | 0.576 | 0.289 | 0.807 | 0.094 |
| n-Heptane | 0.149 | 0.070 | 0.285 | 0.024 |
| n-Octane | 0.050 | 0.020 | 0.079 | 0.005 |
| n-Nonane | 0.030 | 0.010 | 0.030 | 0.002 |
| n-Decane | 0.010 | 0.000 | 0.010 | 0.000 |
| Nitrogen | 0.387 | 0.419 | 0.128 | 0.000 |
| **Total** | **100** | **100** | **100** | **100** |
| **Feed Pressure, barg** | **5.5** | **5.5** | **5.5** | **5.5** |
| **Feed Temperature, ºC** | **32.00** | **15.5** | **46.11** | **26.67** |

1. **DESIGN ASSUMPTIONS**

Following assumptions have been used to perform the current study:

* Capacity : 15.00 MMSCFD
* Compressor Type: Reciprocating (Other information will be completed by vendor).
* Main Equipment: Slug Catcher, Inlet Knock Out Drum, Suction Drum, Reciprocating Compressors, Air Gas Coolers, Gas Compression Discharge Drum, Dehydration Package
* No. Of Duty / Stand By Gas Compressor Trains: 2+1

**Design**:

|  |  |
| --- | --- |
| * Station outlet gas temperature:
 | ~ 60 ºC |
| * Compressor station outlet gas pressure:
 | 49.56 / 58.27 Barg |
| * Compressor polytrophic efficiency:
 | 85% |

**Pressure drop:**

|  |  |
| --- | --- |
| * Air Cooler:
 | 0.7 Bar |
| * Inlet Slug Catcher and Intermediate pressure vessel:
 | 0.2 Bar (including DP for piping)Bar |
| * Dehydration Package:
 | 1 Bar |
| * Pressure drop from outlet control valve of gas compressor to Siahmakan pipeline:
 | 1.98 ~ 3.34 Bar |

1. **SIMULATION SOFTWARE**

ASPEN HYSYS V 11 simulator has been used to simulate the Binak compressor station.

## Thermo-physical Properties prediction Methods

Fluid package which is used in the simulation software shall cover a wide range of pressure and temperature parameters since the fluid pressure and temperature are changed during moving through processing facilities.

Since Peng Robinson equation of state enables to obtain accurate results for a variety of systems over a wide range of conditions, therefore it has been selected as fluid package with ASPEN HYSYS simulation software.

Glycol fluid package is considered for simulation of Dehydration packages

Note: Simulation of Dehydration package shall be finalized by their related vendor.

1. **SIMULATION result**

Following Simulations are reported in winter and summer cases.

*ATTACHMENT I: HYSYS REPORT SUMMER CASE*

*ATTACHMENT 2: HYSYS REPORT WINTER CASE*