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| **طرح نگهداشت و افزایش تولید 27 مخزن** |
| **RELIEF LOAD SUMMERY****نگهداشت و افزایش تولید میدان نفتی بینک** |
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| D04 | Apr.2023 | IFA | M.Aryafar | M.Fakharian | M.Mehrshad |  |
| D03 | Dec.2022 | IFA | M.Aryafar | M.Fakharian | M.Mehrshad |  |
| D02 | Oct.2022 | IFA | M.Aryafar | M.Fakharian | M.Mehrshad |  |
| D01 | Apr.2022 | IFA | M.Aryafar | M.Fakharian | M.Mehrshad |  |
| D00 | Dec.2021 | IFC | M.Aryafar | M.Fakharian | M.Mehrshad |  |
| **Rev.** | **Date** | **Purpose of Issue/Status** | **Prepared by:** | **Checked by:** | **Approved by:** | **CLIENT Approval** |
| **Class:1** | **CLIENT Doc. Number: F0Z-708814** |
| **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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| **4** | X |  |  |  |  |  | **69** |  |  |  |  |  |  |
| **5** | X |  |  |  |  |  | **70** |  |  |  |  |  |  |
| **6** | X | X | X | X | X |  | **71** |  |  |  |  |  |  |
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| **9** |  |  | X |  | X |  | **74** |  |  |  |  |  |  |
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| **11** |  |  | X |  | X |  | **76** |  |  |  |  |  |  |
| **12** |  |  | X | X | X |  | **77** |  |  |  |  |  |  |
| **13** |  |  | X |  |  |  | **78** |  |  |  |  |  |  |
| **14** |  |  | X |  |  |  | **79** |  |  |  |  |  |  |
| **15** |  |  | X | X |  |  | **80** |  |  |  |  |  |  |
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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 Fcilities; 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 scope of this document is to present summary of flare loads in BINAK new gas compressor station unit.

1. **NORMATIVE REFERENCES**

## Local Codes and Standards

|  |  |
| --- | --- |
| * IPS-E-PR-450
 | Process design of pressure relieving Systems inclusive safety relief valves |

## International Codes and Standards

|  |  |
| --- | --- |
| * API-STD-520
 | Sizing, Selection and Installation of Pressure Relieving Devices in Refineries, Part 1-Sizing and Selection |
| * API-STD-521
 | Pressure Relieving and Depressuring Systems |

## The Project Documents

|  |  |
| --- | --- |
| * BK-GNRAL-PEDCO-000-PR-DC-0001
 | Process Design Criteria |
| * BK-GCS-PEDCO-120-PR-PF-0001
 | Process Flow Diagram (PFD) |
| * BK-GCS-PEDCO-120-PR-PI-0002 ~ 0025
 | Piping & Instrumentation Diagram |

## ENVIRONMENTAL DATA

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

1. **RELIEF LOAD SUMMARY TABLE**

## PSV-2111/2112

|  |  |
| --- | --- |
| Location | V-2104 |
| Equipment Size (mm) | (ID X TL-TL) 4200 X 12600 |
| Case | Wetted Fire | Gas Expansion | Blocked Outlet |
| Fluid & State | HC |
| Operating Pressure (barg) | 5.3 |
| Normal Temperature (°C) | 32.0 |
| Set Pressure (barg) | 9 |
| LHV (kJ/kg) | 431.6 | - | - |
| Relief Temperature (°C) | 284 | 284 | 32 |
| Required Massflow (kg/hr) | 37247.2 | 7227.0 | 11270.0 |
| Specific Heat Ratio (Cp/Cv) | 1.223 | 1.260 | 1.260 |
| Molecular Weight (kg/kmol) | 48.1 | 23.57 | 23.57 |
| Compressibility Factor | 0.954 | 0.974 | 0.956 |
| Total Back Pressure (barg) | 3.4 | 3.4 | 0.7 |
| Allowable Over Pressure (%) | 21 | 21 | 10 |
| Calculated Discharge Area (mm2) | 4134 | 1146 | 1428 |
| Required Discharge Area (mm2) | 8742 | 1452 | 2248 |
| Orifice Designation | Q | k | L |
| Body Size | 6 x 8 | 3 x 4 | 3 x 4 |
| P&ID Number | BK-GCS-PEDCO-120-PR-PI-0004 (1/2) |

## PSV-2113/2114

|  |  |
| --- | --- |
| Location | V-2105 |
| Equipment Size (mm) | (ID X TL-TL) 1500 X 4500 |
| Case | Wetted Fire | Gas Expansion | Blocked Outlet |
| Fluid & State | HC |
| Operating Pressure (barg) | 5.1 |
| Normal Temperature (°C) | 36.92 |
| Set Pressure (barg) | 9 |
| LHV (kJ/kg) | 1994 | - | - |
| Relief Temperature (°C) | 182.5 | 330.6 | 36.92 |
| Required Massflow (kg/hr) | 1045.9 | 779.9 | 17833.1 |
| Specific Heat Ratio (Cp/Cv) | 1.154 | 1.246 | 1.246 |
| Molecular Weight (kg/kmol) | 18.02 | 24.52 | 24.52 |
| Compressibility Factor | 0.974 | 0.974 | 0.954 |
| Total Back Pressure (barg) | 3.3 | 3.3 | 1.2 |
| Allowable Over Pressure (%) | 21 | 21 | 10 |
| Calculated Discharge Area (mm2) | 176.97 | 126.67 | 2240.6 |
| Required Discharge Area (mm2) | 254.46 | 254.4 | 3421 |
| Orifice Designation | F | F | N |
| Body Size | 1 1/2 x 2 | 1 1/2 x 2 | 4 x 6 |
| P&ID Number | BK-GCS-PEDCO-120-PR-PI-0005 (1/1) |

## psv-2121-a/b/c

D05

|  |  |
| --- | --- |
| Location | V-2101-A/B/C |
| Equipment Size (mm) | (ID X TL-TL) 900 X 3000 |
| Case | Wetted Fire | Gas Expansion | Control Valve Failiure |
| Fluid & State | HC |
| Operating Pressure (barg) | 4.9 |
| Normal Temperature (°C) | 36.78 |
| Set Pressure (barg) | 22 |
| LHV (kJ/kg) | 1827 | - | - |
| Relief Temperature (°C) | 227.4 | 999 (NOTE) | 60 |
| Required Massflow (kg/hr) | 374.2 | 717.74 | 2166 |
| Specific Heat Ratio (Cp/Cv) | 1.245 | 1.245 | 1.457 |
| Molecular Weight (kg/kmol) | 18.8 | 24.52 | 24.55 |
| Compressibility Factor | 0.975 | 0.975 | 0.822 |
| Total Back Pressure (barg) | 3.1 | 3.1 | 0.5 |
| Allowable Over Pressure (%) | 21 | 21 | 10 |
| Calculated Discharge Area (mm2) | 27.25 | 72.95 | 107.25 |
| Required Discharge Area (mm2) | 153.93 | 153.938 | 153.938 |
| Orifice Designation | D | E | E |
| Body Size | 1 x 2 | 1 x 2 | 1 x 2 |
| P&ID Number | BK-GCS-PEDCO-120-PR-PI-0006 (1,2,3/3) |

(NOTE): Based on API-521 It is common practice to exclude the fire-relief scenario when specifying the maximum design temperature of the flare headers.

## psv-2122/2123-A/B/C

|  |  |
| --- | --- |
| Location | C-2101-A/B/C |
| Equipment Size (mm) | - |
| Case | Wetted Fire | Gas Expansion | Blocked Outlet |
| Fluid & State | HC |
| Operating Pressure (barg) | 19 |
| Normal Temperature (°C) | 124.8 |
| Set Pressure (barg) | 22 |
| LHV (kJ/kg) | - | - | - |
| Relief Temperature (°C) | - | - | 124.8 |
| Required Massflow (kg/hr) | - | - | 8664 |
| Specific Heat Ratio (Cp/Cv) | - | - | 1.225 |
| Molecular Weight (kg/kmol) | - | - | 24.523 |
| Compressibility Factor | - | - | 0.964 |
| Total Back Pressure (barg) | - | - | 0.9 |
| Allowable Over Pressure (%) | - | - | 10 |
| Calculated Discharge Area (mm2) | - | - | 539.85 |
| Required Discharge Area (mm2) |  |  | 1017 |
| Orifice Designation | - | - | J |
| Body Size | - | - | 2 x 3 |
| P&ID Number | BK-GCS-PEDCO-120-PR-PI-0007 (1,2,3/3) |

## psv-2131-a/b/c

|  |  |
| --- | --- |
| Location | V-2102-A/B/C |
| Equipment Size (mm) | (ID X TL-TL) 900 X 3000 |
| Case | Wetted Fire | Gas Expansion | Blocked Outlet |
| Fluid & State | HC |
| Operating Pressure (barg) | 18.1 |
| Normal Temperature (°C) | 60 |
| Set Pressure (barg) | 22 |
| LHV (kJ/kg) | 1807 | - | - |
| Relief Temperature (°C) | 224 | 208 | - |
| Required Massflow (kg/hr) | 378.37 | 982.27 | - |
| Specific Heat Ratio (Cp/Cv) | 1.278 | 1.278 | - |
| Molecular Weight (kg/kmol) | 18.02 | 24.523 | - |
| Compressibility Factor | 0.936 | 0.936 | - |
| Total Back Pressure (barg) | 3.4 | 3.4 | - |
| Allowable Over Pressure (%) | 21 | 21 | - |
| Calculated Discharge Area (mm2) | 27.22 | 59.62 | - |
| Required Discharge Area (mm2) | 153.93 | 153.93 |  |
| Orifice Designation | D | D | - |
| Body Size | 1 x 2 | 1 x 2 | - |
| P&ID Number | BK-GCS-PEDCO-120-PR-PI-0009 (1,2,3/3) |

## psv-2132/2133-a/b/c

|  |  |
| --- | --- |
| Location | C-2102-A/B/C |
| Equipment Size (mm) | - |
| Case | Wetted Fire | Gas Expansion | Blocked Outlet |
| Fluid & State | HC |
| Operating Pressure (barg) | 54.8 |
| Normal Temperature (°C) | 142.3 |
| Set Pressure (barg) | 62 |
| LHV (kJ/kg) | - | - | - |
| Relief Temperature (°C) | - | - | 142.3 |
| Required Massflow (kg/hr) | - | - | 8664 |
| Specific Heat Ratio (Cp/Cv) | - | - | 1.278 |
| Molecular Weight (kg/kmol) | - | - | 24.52 |
| Compressibility Factor | - | - | 0.923 |
| Total Back Pressure (barg) | - | - | 1.0 |
| Allowable Over Pressure (%) | - | - | 10 |
| Calculated Discharge Area (mm2) | - | - | 193.67 |
| Required Discharge Area (mm2) | - | - | 397.60 |
| Orifice Designation | - | - | G |
| Body Size | - | - | 1 1/2 x 3 |
| P&ID Number | BK-GCS-PEDCO-120-PR-PI-0010 (1,2,3/3) |

## psv-2141/2142

|  |  |
| --- | --- |
| Location | V-2103 |
| Equipment Size (mm) | (ID X TL-TL) 900 X 3000 |
| Case | Wetted Fire | Gas Expansion | Blocked Outlet |
| Fluid & State | HC |
| Operating Pressure (barg) | 53.9 |
| Normal Temperature (°C) | 60 |
| Set Pressure (barg) | 62 |
| LHV (kJ/kg) | 1456 | - | - |
| Relief Temperature (°C) | 286 | 188 | 60 |
| Required Massflow (kg/hr) | 469.593 | 1826.19 | 17252.5 |
| Specific Heat Ratio (Cp/Cv) | 1.461 | 1.461 | 1.461 |
| Molecular Weight (kg/kmol) | 18.96 | 24.562 | 24.562 |
| Compressibility Factor | 0.823 | 0.823 | 0.823 |
| Total Back Pressure (barg) | 0.6 | 0.6 | 1.0 |
| Allowable Over Pressure (%) | 21 | 21 | 10 |
| Calculated Discharge Area (mm2) | 11.36 | 35.26 | 311 |
| Required Discharge Area (mm2) | 153.93 | 153.93 | 629.01 |
| Orifice Designation | D | D | H |
| Body Size | 1 x 2 | 1 x 2 | 2 x 3 |
| P&ID Number | BK-GCS-PEDCO-120-PR-PI-0012 (1/1) |

## psv-2201(NOTE)

|  |  |
| --- | --- |
| Location | V-2203 |
| Equipment Size (mm) | (ID X TL-TL) 1500 X 5000 |
| Case | Wetted Fire | Gas Expansion | Blocked Outlet |
| Fluid & State | Air |
| Operating Pressure (barg) | 8 |
| Normal Temperature (°C) | 65 |
| Set Pressure (barg) | 12.5 |
| LHV (kJ/kg) | 1949 | - | - |
| Relief Temperature (°C) | 201.7 | 323.4 | - |
| Required Massflow (kg/hr) | 338.521 | 1071.801 | - |
| Specific Heat Ratio (Cp/Cv) | 1.416 | 1.416 | - |
| Molecular Weight (kg/kmol) | 18.02 | 28.95 | - |
| Compressibility Factor | 0.990 | 0.990 | - |
| Total Back Pressure (barg) | 0.0 | 0.0 | - |
| Allowable Over Pressure (%) | 21 | 21 | - |
| Calculated Discharge Area (mm2) | 40.44 | 113.24 | - |
| Required Discharge Area (mm2) | 153.93 | 153.95 |  |
| Orifice Designation | D | E | - |
| Body Size | 1 x 2 | 1 x 2 | - |
| P&ID Number | BK-GCS-PEDCO-120-PR-PI-0015 (2/2) |

NOTE: 2 X 100 PSVs, ONE Duty ONE Standby

## psv-2211

|  |  |
| --- | --- |
| Location | V-2204 |
| Equipment Size (mm) | (ID X TL-TL) 1050 X 3150 |
| Case | Wetted Fire | Gas Expansion | Blocked Outlet |
| Fluid & State | Nitrogen |
| Operating Pressure (barg) | 8 |
| Normal Temperature (°C) | 60 |
| Set Pressure (barg) | 12.5 |
| LHV (kJ/kg) | 1950 | - | - |
| Relief Temperature (°C) | 195.9 | 323.4 | - |
| Required Massflow (kg/hr) | 408.2 | 500.391 | - |
| Specific Heat Ratio (Cp/Cv) | 1.4 | 1.4 | - |
| Molecular Weight (kg/kmol) | 19.22 | 28 | - |
| Compressibility Factor | 1.0 | 1.0 | - |
| Total Back Pressure (barg) | 0.5 | 0.5 | - |
| Allowable Over Pressure (%) | 21 | 21 | - |
| Calculated Discharge Area (mm2) | 47.363 | 54.241 | - |
| Required Discharge Area (mm2) | 153.9 | 153.9 | - |
| Orifice Designation | D | D | - |
| Body Size | 1 x 2 | 1 x 2 | - |
| P&ID Number | BK-GCS-PEDCO-120-PR-PI-0016 (1/1) |

## psv-2271

|  |  |
| --- | --- |
| Location | V-2205 |
| Equipment Size (mm) | (ID X TL-TL) 438 X 2950 |
| Case | Wetted Fire | Gas Expansion | Blocked Outlet |
| Fluid & State | HC |
| Operating Pressure (barg) | 4.9 |
| Normal Temperature (°C) | 36.78 |
| Set Pressure (barg) | 9 |
| LHV (kJ/kg) | 1994 | - | - |
| Relief Temperature (°C) | 182.6 | 350.7 | - |
| Required Massflow (kg/hr) | 174.5 | 114.131 | - |
| Specific Heat Ratio (Cp/Cv) | 1.245 | 1.245 | - |
| Molecular Weight (kg/kmol) | 18.02 | 24.523 | - |
| Compressibility Factor | 0.975 | 0.975 | - |
| Total Back Pressure (barg) | 3.2 | 3.2 | - |
| Allowable Over Pressure (%) | 21 | 21 | - |
| Calculated Discharge Area (mm2) | 28.75 | 18.858 | - |
| Required Discharge Area (mm2) | 153.9 | 153.9 | - |
| Orifice Designation | D | D | - |
| Body Size | 1 x 2 | 1 x 2 | - |
| P&ID Number | BK-GCS-PEDCO-120-PR-PI-0022 (1/1) |

## psv-2293

|  |  |
| --- | --- |
| Location | V-2107 |
| Equipment Size (mm) | (ID X TL-TL) 1100 X 3600 |
| Case | Wetted Fire | Gas Expansion | Blocked Outlet |
| Fluid & State | TEG |
| Operating Pressure (barg) | 0.1 |
| Normal Temperature (°C) | Amb. |
| Set Pressure (barg) | 3.5 |
| LHV (kJ/kg) | 314.3 | - | - |
| Relief Temperature (°C) | 335.9 | 335.9 | - |
| Required Massflow (kg/hr) | 2098.01 | 76.53 | - |
| Specific Heat Ratio (Cp/Cv) | 1.083 | 1.083 | - |
| Molecular Weight (kg/kmol) | 143.6 | 143.6 | - |
| Compressibility Factor | 0.646 | 0.646 | - |
| Total Back Pressure (barg) | 0.1 | 0.1 | - |
| Allowable Over Pressure (%) | 21 | 21 | - |
| Calculated Discharge Area (mm2) | 275 | 10.03 | - |
| Required Discharge Area (mm2) | 397.6 | 153.9 |  |
| Orifice Designation | G | D | - |
| Body Size | 1 1/2 x 3 | 1 x 2 | - |
| P&ID Number | BK-GCS-PEDCO-120-PR-PI-0025 (1/1) |