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|  | <p>نگهداشت و افزایش تولید میدان نفتی بینک<br/>سطح الارض</p> <p>احداث ردیف تراکم گاز در ایستگاه جمع آوری بینک</p> |           |            |         |      |          |       |   |
| شماره پیمان:<br>053 – 073 – 9184                                                  | DUTY SPECIFICATION FOR LP FLARE PACKAGE (PK-2201)                                                                |           |            |         |      |          |       | شماره صفحه: 1 از 11                                                                                                                                                     |
|                                                                                   | پروژه                                                                                                            | بسته کاری | صادر کننده | تسهیلات | رشته | نوع مدرک | سریال |                                                                                                                                                                         |
|                                                                                   | BK                                                                                                               | GCS       | PEDCO      | 120     | PR   | SP       | 0003  | D03                                                                                                                                                                     |

## طرح نگهداشت و افزایش تولید 27 مخزن

### Duty Specification For LP Flare Package (PK-2201)

#### نگهداشت و افزایش تولید میدان نفتی بینک

| Rev. | Date     | Purpose of Issue/Status | Prepared by: | Checked by: | Approved by: | CLIENT Approval |
|------|----------|-------------------------|--------------|-------------|--------------|-----------------|
| D03  | Apr.2023 | IFA                     | M.Aryafar    | M.Fakharian | M.Mehrshad   |                 |
| D02  | Dec.2022 | IFA                     | M.Aryafar    | M.Fakharian | M.Mehrshad   |                 |
| D01  | Oct.2022 | IFA                     | M.Aryafar    | M.Fakharian | M.Mehrshad   |                 |
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Class: 2

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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

|                                                                                   |                                                                                                                                                                                                                                                                                                                        |                                                                                     |           |            |          |       |          |       |      |    |     |       |     |    |    |      |     |                      |
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|  | <p>نگهداشت و افزایش تولید میدان نفتی بینک<br/>سطح الارض</p> <p>احداث ردیف تراکم گاز در ایستگاه جمع آوری بینک</p>                                                                                                                                                                                                       |  |           |            |          |       |          |       |      |    |     |       |     |    |    |      |     |                      |
| شماره پیمان:<br>053 – 073 – 9184                                                  | <p>DUTY SPECIFICATION FOR LP FLARE PACKAGE (PK-2201)</p> <table><tr><td>پروژه</td><td>بسته کاری</td><td>صادر کننده</td><td>تسهیلات</td><td>رشته</td><td>نوع مدرک</td><td>سریال</td><td>نسخه</td></tr><tr><td>BK</td><td>GCS</td><td>PEDCO</td><td>120</td><td>PR</td><td>SP</td><td>0003</td><td>D03</td></tr></table> | پروژه                                                                               | بسته کاری | صادر کننده | تسهیلات  | رشته  | نوع مدرک | سریال | نسخه | BK | GCS | PEDCO | 120 | PR | SP | 0003 | D03 | شماره صفحه : 2 از 11 |
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| BK                                                                                | GCS                                                                                                                                                                                                                                                                                                                    | PEDCO                                                                               | 120       | PR         | SP       | 0003  | D03      |       |      |    |     |       |     |    |    |      |     |                      |

### REVISION RECORD SHEET

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|  | <p>نگهداشت و افزایش تولید میدان نفتی بینک<br/>سطح الارض</p> <p>احداث ردیف تراکم گاز در ایستگاه جمع آوری بینک</p> |           |            |         |      |          |       |  |
| شماره پیمان:<br>053 – 073 – 9184                                                  | DUTY SPECIFICATION FOR LP FLARE PACKAGE (PK-2201)                                                                |           |            |         |      |          |       | شماره صفحه : 3 از 11                                                                |
|                                                                                   | پروژه                                                                                                            | بسته کاری | صادر کننده | تسهیلات | رشته | نوع مدرک | سریال |                                                                                     |
|                                                                                   | BK                                                                                                               | GCS       | PEDCO      | 120     | PR   | SP       | 0003  | D03                                                                                 |

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| شماره پیمان:<br>053 – 073 – 9184                                                  | <table><tr><th colspan="8">DUTY SPECIFICATION FOR LP FLARE PACKAGE (PK-2201)</th></tr><tr><th>پروژه</th><th>بسته کاری</th><th>صادر کننده</th><th>تسهیلات</th><th>رشته</th><th>نوع مدرک</th><th>سریال</th><th>نسخه</th></tr><tr><td>BK</td><td>GCS</td><td>PEDCO</td><td>120</td><td>PR</td><td>SP</td><td>0003</td><td>D03</td></tr></table> | DUTY SPECIFICATION FOR LP FLARE PACKAGE (PK-2201)                                   |         |      |          |       |      |  |  | پروژه | بسته کاری | صادر کننده | تسهیلات | رشته | نوع مدرک | سریال | نسخه | BK | GCS | PEDCO | 120 | PR | SP | 0003 | D03 | شماره صفحه : 4 از 11 |
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| پروژه                                                                             | بسته کاری                                                                                                                                                                                                                                                                                                                                    | صادر کننده                                                                          | تسهیلات | رشته | نوع مدرک | سریال | نسخه |  |  |       |           |            |         |      |          |       |      |    |     |       |     |    |    |      |     |                      |
| BK                                                                                | GCS                                                                                                                                                                                                                                                                                                                                          | PEDCO                                                                               | 120     | PR   | SP       | 0003  | D03  |  |  |       |           |            |         |      |          |       |      |    |     |       |     |    |    |      |     |                      |

## 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.                                                             |

|                                                                                   |                                                                                                                  |           |            |         |      |          |       |                                                                                     |      |
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|  | <p>نگهداشت و افزایش تولید میدان نفتی بینک<br/>سطح الارض</p> <p>احداث ردیف تراکم گاز در ایستگاه جمع آوری بینک</p> |           |            |         |      |          |       |  |      |
| شماره پیمان:<br>053 – 073 – 9184                                                  | DUTY SPECIFICATION FOR LP FLARE PACKAGE (PK-2201)                                                                |           |            |         |      |          |       | شماره صفحه : 5 از 11                                                                |      |
|                                                                                   | پروژه                                                                                                            | بسته کاری | صادر کننده | تسهیلات | رشته | نوع مدرک | سریال |                                                                                     | نسخه |
|                                                                                   | BK                                                                                                               | GCS       | PEDCO      | 120     | PR   | SP       | 0003  | D03                                                                                 |      |

## 2.0 SCOPE

This specification outlines the minimum process requirements for design of Associated LP Flare package in Binak Plant.

## 3.0 NORMATIVE REFERENCES

### 3.1 REFERENCE DOCUMENTS

- BK-GNRAL-PEDCO-000-PR-DB-0001 Process Basis Of Design
- BK-GCS-PEDCO-120-PR-RT-0001 Flare Network Study Report
- BK-GCS-PEDCO-120-PR-RT-0002 Flare Radiation & Dispersion Study Report

### 3.2 LOCAL CODES AND STANDARDS

- IPS-E-PR-460 Process Design Of Flare And Blowdown Systems

### 3.3 INTERNATIONAL CODES AND STANDARDS

- API 537 Flare Details for General Refinery and Petrochemical Service

|                                                                                   |                                                                                                                  |           |            |         |      |          |       |                                                                                     |
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|  | <p>نگهداشت و افزایش تولید میدان نفتی بینک<br/>سطح الارض</p> <p>احداث ردیف تراکم گاز در ایستگاه جمع آوری بینک</p> |           |            |         |      |          |       |  |
| شماره پیمان:<br>053 – 073 – 9184                                                  | DUTY SPECIFICATION FOR LP FLARE PACKAGE (PK-2201)                                                                |           |            |         |      |          |       | شماره صفحه : 6 از 11                                                                |
|                                                                                   | پروژه                                                                                                            | بسته کاری | صادر کننده | تسهیلات | رشته | نوع مدرک | سریال |                                                                                     |
|                                                                                   | BK                                                                                                               | GCS       | PEDCO      | 120     | PR   | SP       | 0003  | D03                                                                                 |

## 4.0 LP FLARE PACKAGE

### 4.1 BASIS OF DESIGN



#### 4.1.1 General

According to flare load summary calculation for different units with different scenarios, 1. Fire case at compressor station by Fire Case area 1(PSV-2111/2112, PSV-2113/2114, PSV-2131A, PSV-2121A, PSV-2271 are in fire) has been chosen as sizing scenario for flare network.

Accordingly, flow rate of 39824 kg/hr of gas will route to flare network in fire conditions.

The flare network has been designed based on piping plan and flow characteristics considerations. Based on these considerations, one flare knock-out drum (V-2201) has been considered to be located on system, near to flare stack. Effluents from sub-headers will be routed to flare main header and in continue, to the flare K.O. Drum (V-2201) with maximum flow rate of 39824 kg/hr.

Two unloading pumps (P-2201 A/B; 1 in operation and 1 in standby mode) have been considered to unload the drum to closed drain header when liquid content inside the drum reaches to a set value. A level transmitter (LIT-2251) is located on V-2201 and generates level signals for alarm production and/or pump start and stop. When the level increases to set point (HLL) the controller (LICA-2251) starts the pumps (P-2201A/B) and when it decreases to low point it will stops them.

Outlet line of V-2201 will be routed to flare stack.

|                                                                                   |                                                                                                                  |           |           |         |      |          |       |                                                                                     |      |
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| شماره پیمان:                                                                      | DUTY SPECIFICATION FOR LP FLARE PACKAGE (PK-2201)                                                                |           |           |         |      |          |       | شماره صفحه: 7 از 11                                                                 |      |
| 053 – 073 – 9184                                                                  | پروژه                                                                                                            | بسته کاری | صادرکننده | تسهیلات | رشته | نوع مدرک | سریال |                                                                                     | نسخه |
|                                                                                   | BK                                                                                                               | GCS       | PEDCO     | 120     | PR   | SP       | 0003  |                                                                                     | D03  |

## 4.1.2 Design Basis

### 4.1.2.1 Basis for Flare Design

- Design Temperature: 85°C (Will be finalized by vendor.)
- Flare Structure Height: 22.2 m (To be specified by vendor. Height shall cope with allowable radiation levels and dispersion study results.)
- Solar Radiation: 1.01 kW/m<sup>2</sup>
- Noise Level: Distances from the flare stack for all relief scenarios.

### 4.1.2.2 Characteristics of The Gas to be flared



| Study Case                            |                  | Fire Case<br>(PSV-2111/2112, PSV-2113/2114, PSV-2131A, PSV-2121A, PSV-2271 are in fire) | Continuous Flaring |
|---------------------------------------|------------------|-----------------------------------------------------------------------------------------|--------------------|
| Flowrate (kg/hr)                      |                  | 39824                                                                                   | 170                |
| M.W.                                  |                  | 48.1                                                                                    | 24.6               |
| L.H.V. (kJ/kg) (NOTE 1)               |                  | By Vendor                                                                               | By Vendor          |
| Temperature [°C] (Min./Max.) (NOTE 2) |                  | 272                                                                                     | 36                 |
| Cp/Cv (NOTE 2)                        |                  | 1.074                                                                                   | 1.3                |
| Composition<br>(%mol)                 | Nitrogen         | 0.0000                                                                                  |                    |
|                                       | CO <sub>2</sub>  | 0.001000                                                                                |                    |
|                                       | H <sub>2</sub> S | 0.015006                                                                                |                    |
|                                       | Methane          | 0.006002                                                                                |                    |
|                                       | Ethane           | 0.015006                                                                                |                    |
|                                       | Propane          | 0.039016                                                                                |                    |
|                                       | i-Butane         | 0.011004                                                                                |                    |
|                                       | n-Butane         | 0.033013                                                                                |                    |
|                                       | i-Pentane        | 0.042017                                                                                |                    |
|                                       | n-Pentane        | 0.027011                                                                                |                    |
|                                       | n-Hexane         | 0.136054                                                                                |                    |
|                                       | n-Heptane        | 0.074030                                                                                |                    |
|                                       | n-Octane         | 0.041016                                                                                |                    |
|                                       | n-Nonane         | 0.026010                                                                                |                    |

|                                                                                   |                                                                                                                  |           |            |         |      |          |       |                                                                                     |                      |
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|  | <p>نگهداشت و افزایش تولید میدان نفتی بینک<br/>سطح الارض</p> <p>احداث ردیف تراکم گاز در ایستگاه جمع آوری بینک</p> |           |            |         |      |          |       |  |                      |
| شماره پیمان:<br>053 – 073 – 9184                                                  | DUTY SPECIFICATION FOR LP FLARE PACKAGE (PK-2201)                                                                |           |            |         |      |          |       |                                                                                     | شماره صفحه : 8 از 11 |
|                                                                                   | پروژه                                                                                                            | بسته کاری | صادر کننده | تسهیلات | رشته | نوع مدرک | سریال | نسخه                                                                                |                      |
|                                                                                   | BK                                                                                                               | GCS       | PEDCO      | 120     | PR   | SP       | 0003  | D03                                                                                 |                      |

|                                                |                  |                                 |                                 |
|------------------------------------------------|------------------|---------------------------------|---------------------------------|
|                                                | n-Decane         | 0.006002                        |                                 |
|                                                | n-C11            | 0.002001                        |                                 |
|                                                | H <sub>2</sub> O | 0.525812                        |                                 |
| Sulfur Content (Wt %)                          |                  | 0.984                           | 7.075                           |
| Sour Service (YES/NO)                          |                  | Yes                             | Yes                             |
| Discharge (Con./Inter.)                        |                  | Intermittent                    | Continuouse                     |
| Max. Allow. Press. Drop (bar)<br>(NOTE 3)      |                  | 0.1                             | 0.1                             |
| Smokeless Operation (YES/NO)<br>(NOTE 4)       |                  | Yes                             | Yes                             |
| Flexibility (% of normal flowrate)<br>(NOTE 5) |                  | Max. Flexibility Range Required | Max. Flexibility Range Required |

#### Notes:

- 1) To be specified or confirmed by supplier.
- 2) Distances from the flare stack for all relief scenarios.
- 3) Maximum available pressure at stack base: 1.1 Bara. Pressure drop through the tip and stack to be minimized by Supplier.
- 4) Supplier shall define the flowrate range as a percent of design flow in which the flare will operate relatively smokeless without the injection of air or steam.  
Minimum smoke free flaring for 25% of design relief flow.  
Air blower shall be considered for air assisted smokeless flare.
- 5) Flare shall operate under normal operation conditions as well as under emergency conditions.

#### 4.1.2.3 Ignition Panel

- Flare Front Generator: No
- High Energy Generator: Yes
- Remote Ignition System: Yes
- Flame Detector: Yes (Supplier to advise)
- Internal Combustion Detector: Yes
- Automatic Re-Ignition System: Yes
- Smokeless Operation: Yes (Minimum smoke free flaring for 25% of design relief flow.)
- Medium: Air (Air blower shall be considered for air assisted smokeless flare.)
- Installation: Supplier to advise
- Wind Screen/Solar Screen: Vendor's standard
- LPG Bottles for Pilot Gas Backup: Yes (for 12 hours)
- Aircraft Warning Lights: Yes



|                                                                                   |                                                                                                                  |           |           |         |      |          |       |                                                                                     |                      |
|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|-----------|-----------|---------|------|----------|-------|-------------------------------------------------------------------------------------|----------------------|
|  | <p>نگهداشت و افزایش تولید میدان نفتی بینک<br/>سطح الارض</p> <p>احداث ردیف تراکم گاز در ایستگاه جمع آوری بینک</p> |           |           |         |      |          |       |  |                      |
| شماره پیمان:<br><br>053 – 073 – 9184                                              | DUTY SPECIFICATION FOR LP FLARE PACKAGE (PK-2201)                                                                |           |           |         |      |          |       |                                                                                     | شماره صفحه : 9 از 11 |
|                                                                                   | پروژه                                                                                                            | بسته کاری | صادرکننده | تسهیلات | رشته | نوع مدرک | سریال | نسخه                                                                                |                      |
|                                                                                   | BK                                                                                                               | GCS       | PEDCO     | 120     | PR   | SP       | 0003  | D03                                                                                 |                      |

#### 4.1.2.4 Required Fuel Gas

| Study Case            |                  | Fuel Gas  |
|-----------------------|------------------|-----------|
| Flowrate (kg/hr)      |                  | By Vendor |
| M.W.                  |                  | By Vendor |
| L.H.V. (kJ/kg)        |                  | By Vendor |
| Temp. (Min./Max.)     |                  | By Vendor |
| Cp/Cv                 |                  | 1.216     |
| Composition<br>(%mol) | Nitrogen         | 0.0030    |
|                       | CO <sub>2</sub>  | 0.0316    |
|                       | H <sub>2</sub> S | 0.0541    |
|                       | Methane          | 0.6389    |
|                       | Ethane           | 0.1375    |
|                       | Propane          | 0.0773    |
|                       | i-Butane         | 0.0084    |
|                       | n-Butane         | 0.0186    |
|                       | i-Pentane        | 0.0070    |
|                       | n-Pentane        | 0.0038    |
|                       | n-Hexane         | 0.0065    |
|                       | n-Heptane        | 0.0020    |
|                       | n-Octane         | 0.0006    |
|                       | n-Nonane         | 0.0003    |
|                       | n-Decane         | 0.0001    |
|                       | H <sub>2</sub> O | 0.0103    |

#### 4.1.2.5 Basis for Equipment Mechanical Design

##### Expected Material:

- Integrated Flare K.O. Drum: To be specified or confirmed by Supplier
- Flare Stack (as minimum): Carbon Steel+3mm (VTC)
- Piping, Pilot - Ignition Lines Tip (as minimum): SS304(VTC)
- Flare Tip (as minimum): SS310 (VTC)

|                                                                                            |                                                                                                                  |           |            |         |      |          |       |                                                                                     |      |
|--------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|-----------|------------|---------|------|----------|-------|-------------------------------------------------------------------------------------|------|
| <br>NISOC | <p>نگهداشت و افزایش تولید میدان نفتی بینک<br/>سطح الارض</p> <p>احداث ردیف تراکم گاز در ایستگاه جمع آوری بینک</p> |           |            |         |      |          |       |  |      |
| شماره پیمان:<br><br>053 – 073 – 9184                                                       | DUTY SPECIFICATION FOR LP FLARE PACKAGE (PK-2201)                                                                |           |            |         |      |          |       | شماره صفحه : 10 از 11                                                               |      |
|                                                                                            | پروژه                                                                                                            | بسته کاری | صادر کننده | تسهیلات | رشته | نوع مدرک | سریال |                                                                                     | نسخه |
|                                                                                            | BK                                                                                                               | GCS       | PEDCO      | 120     | PR   | SP       | 0003  |                                                                                     | D03  |

#### Corrosion Allowance:

- No corrosion allowance for SS
- 3.2 mm corrosion allowance for CS

#### **4.1.3 SITE CONDITION**

For site condition, refer to “Process Basis Of Design - BK-GNRAL-PEDCO-000-PR-DB-0001”.

#### **4.1.4 AVAILABLE UTILITIES**

The available utilities for the packages and their conditions are listed in “Process Basis Of Design - BK-GNRAL-PEDCO-000-PR-DB-0001”.

### **4.2 SCOPE OF ENGINEERING AND SUPPLY SERVICES**

The VENDOR is responsible for all engineering, design, fabrication, assembly, delivery, and documentation of the complete integrated package.

The equipment shall be delivered to site as complete as possible. The minimum amount of disassembly shall be performed to minimize reassembly on site.

The scope of supply includes but is not limited to the following equipment:

- Flare Stack and Flare Tip
- Integrated Flare K.O. Drum (If required, supplier to advise)
- Dynamic Seal
- Pilots and Ignition System

### **4.3 DOCUMENT REQUIREMENT FROM VENDOR**

- Process Basis of Design
- Equipment Datasheet
- Utility Consumption List
- Equipment List
- Instrument Datasheet
- Operating and Maintenance Manual
- Alarm and Trip Set Point List
- Piping and Instrumentation Diagram
- Control Philosophy and Complex Loop Description
- Start-up and Shutdown Procedure

|                                                                                            |                                                                                                                  |           |           |         |      |          |       |                                                                                     |      |
|--------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|-----------|-----------|---------|------|----------|-------|-------------------------------------------------------------------------------------|------|
| <br>NISOC | <p>نگهداشت و افزایش تولید میدان نفتی بینک<br/>سطح الارض</p> <p>احداث ردیف تراکم گاز در ایستگاه جمع آوری بینک</p> |           |           |         |      |          |       |  |      |
| شماره پیمان:<br>053 – 073 – 9184                                                           | DUTY SPECIFICATION FOR LP FLARE PACKAGE (PK-2201)                                                                |           |           |         |      |          |       | شماره صفحه : 11 از 11                                                               |      |
|                                                                                            | پروژه                                                                                                            | بسته کاری | صادرکننده | تسهیلات | رشته | نوع مدرک | سریال |                                                                                     | نسخه |
|                                                                                            | BK                                                                                                               | GCS       | PEDCO     | 120     | PR   | SP       | 0003  |                                                                                     | D03  |

#### 4.4 GUARANTEES

The VENDOR shall guarantee:

- Good and safe operation of the flares for the conditions described hereabove, and for the worst climatic conditions
- Maximum radiation and dispersion values for the specified flare heights
- Utility consumptions
- Pilot stability and reigniting of the flares even under the worst climatic conditions
- Pressure drop through the system
- Noise levels
- Service life of the flare tips for the continuous flaring case

#### 4.5 DESIGN REVIEW RESPONSIBILITY OF VENDOR

VENDOR shall have Attendance at design (including design for constructability), coordination, HAZOP (Hazard & Operability) review meetings at the client/consultant office. VENDOR shall have overall responsibility for the proper design and safety of the equipment supplied. Any items required as a result of the HAZOP actions are to be fully implemented by VENDOR.

VENDOR shall ensure the relevant personnel are available during the course of the HAZOP sessions. Client/Consultant may ask vendor to participate to further reviews such as Constructability and Maintainability for the equipment to be supplied.

The VENDOR shall include in the package cost, the cost of him and his instruments/ controls SUB-VENDOR(S) participation in the HAZOP & HAZID Study which will be conducted by the client/Consultant.