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| **طرح نگهداشت و افزایش تولید 27 مخزن** | | | | | | |
| **CALCULATION NOTE FOR TOTAL FLOODING DEMAND FOR EXTENSION OF EXISTING ELECT. BUILDING**  **نگهداشت و افزایش تولید میدان نفتی بینک** | | | | | | |
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| D02 | APR. 2023 | AFD | A.H.Saber | M.Fakharian | A.M.MOHSENI |  |
| D01 | MAR. 2022 | AFD | A.H.Saber | M.Fakharian | M.MEHRSHAD |  |
| D00 | JAN. 2022 | IFC | A.H.Saber | M.Fakharian | M.MEHRSHAD |  |
| **Rev.** | **Date** | **Purpose of Issue/Status** | **Prepared by:** | **Checked by:** | **Approved by:** | **CLIENT Approval** |
| **Class: 2** | | **CLIENT Doc. Number:** **F0Z-708986** | | | | |
| **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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| **PAGE** | **D00** | **D01** | **D02** | **D03** | **D04** |  | **PAGE** | **D00** | **D01** | **D02** | **D03** | **D04** |
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| **2** | X | X | X |  |  | **67** |  |  |  |  |  |
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1. **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 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 objective of this report is to estimate CO2 requirement for new extension of switchgear room for Binak Oilfield Development.

1. **NORMATIVE REFERENCES**

## Local Codes and Standards

* IPS-E-SF-160 Engineering Standard for CO2 Gas Fire Extinguishing Systems.

## International Codes and Standards

* IEC 60529 Specification for Degrees of Protection Provided by Enclosures
* NFPA 12 CO2 Fixed Fire Protection Systems
* NFPA 72 National Fire Alarm Code
* ISO 3500 Gas cylinders – Seamless steel CO2 cylinders for fixed fire-fighting installations on ships
* ISO 3500/A1 Amendment 1 to Standard 3500:2005
* IEC 6183 Fire protection equipment – Carbon dioxide extinguishing systems for use on premises – Design and installation

## The Project Documents

* BK-GNRAL-PEDCO-000-SA-SP-0005 Specification for Total Flooding System

## ENVIRONMENTAL DATA

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

1. **CALCULATION**

**CO2 SYSTEM**

CO2 total flooding shall be provided for:

* Capacitor Bank Room
* Cable Gallery
* High Voltage Room
* Low Voltage Room

**Dimension:**

|  |  |
| --- | --- |
| Room | Dimension (Width x Length x Height) - Meters |
| Capacitor Bank Room | 6.3 x 3.7 x 4.1 |
| Cable Gallery | 24.7 x 5.3 x 4 |
| High Voltage Room | 29.8 x 5.3 x 4 |
| Low Voltage Room | 29.8 x 10.8 x2.2 |

## Calculation Report (Capacitor Bank Room)

|  |  |
| --- | --- |
| Zone : | Capacitor Bank Room  02 |
| Equipment: | Electrical Panels & Cables  02 |
| Volume : | 6.3 x 3.7 x 4.1 = 95.6 m3 |
| Area Classification: | Class C-electrical fire |
| System : | Automatic CO2 |
| Code & Standard : | NFPA 12 |
| Type of System: | Total flooding - Multiple System |
| Type of Fire : | Deep seated |
| Flooding factor : | 1.33 Kg/ m3 (according to table 5.4.2.1 NFPA 12) |
| Safety Factor: | 1.1 |
| Discharge Time : | 7 Minutes (according to 5.5.2.3 NFPA 12) |
| Concentration of CO2: | 30 % in 2 minutes and 50% in 7 minutes (according to 5.5.2.3 NFPA 12) |
| Formula : | Total CO2 required = (Vol.) x (Flooding Factor) x ( Safety Factor) |
| CO2 Required: | 140 Kg |
| Cylinder Capacity : | 67 Lit ( 45 Kg) |
| No. of Cylinders : | 4 |
|  |  |

## Calculation Report (HV Room)

|  |  |
| --- | --- |
| Zone : | High Voltage Room |
| Equipment: | Electrical Panels & Cables  02 |
| Volume : | 24.7 x 5.3 x 4 =524 m3 |
| Area Classification: | Class C-electrical fire |
| System : | Automatic CO2 |
| Code & Standard : | NFPA 12 |
| Type of System: | Total flooding - Multiple System |
| Type of Fire : | Deep seated |
| Flooding factor : | 1.33 Kg/ m3 (according to table 5.4.2.1 NFPA 12) |
| Safety Factor: | 1.1 |
| Discharge Time : | 7 Minutes (according to 5.5.2.3 NFPA 12) |
| Concentration of CO2: | 30 % in 2 minutes and 50% in 7 minutes (according to 5.5.2.3 NFPA 12) |
| Formula : | Total CO2 required = (Vol.) x (Flooding Factor) x ( Safety Factor) |
| CO2 Required: | 767 Kg |
| Cylinder Capacity : | 67 Lit ( 45 Kg) |
| No. of Cylinders : | 17 |
|  |  |

## Calculation Report (LV Room)

02

|  |  |
| --- | --- |
| Zone : | Low Voltage Room |
| Equipment: | Electrical Panels & Cables |
| Volume : | 29.8 x 5.3 x 4 = 632 m3 |
| Area Classification: | Class C-electrical fire |
| System : | Automatic CO2 |
| Code & Standard : | NFPA 12 |
| Type of System: | Total flooding - Multiple System |
| Type of Fire : | Deep seated |
| Flooding factor : | 1.33 Kg/ m3 (according to table 5.4.2.1 NFPA 12) |
| Safety Factor: | 1.1 |
| Discharge Time : | 7 Minutes (according to 5.5.2.3 NFPA 12) |
| Concentration of CO2: | 30 % in 2 minutes and 50% in 7 minutes (according to 5.5.2.3 NFPA 12) |
| Formula : | Total CO2 required = (Vol.) x (Flooding Factor) x ( Safety Factor) |
| CO2 Required: | 925 Kg |
| Cylinder Capacity : | 67 Lit ( 45 Kg) |
| No. of Cylinders : | 21 |
|  |  |

## Calculation Report (cable gallary Room)

02

|  |  |
| --- | --- |
| Zone : | Cable Gallery Room |
| Equipment: | Electrical Panels & Cables |
| Volume : | 29.8 x 10.8 x 2.2 =708 m3 |
| Area Classification: | Class C-electrical fire |
| System : | Automatic CO2 |
| Code & Standard : | NFPA 12 |
| Type of System: | Total flooding - Multiple System |
| Type of Fire : | Deep seated |
| Flooding factor : | 1.33 Kg/ m3 (according to table 5.4.2.1 NFPA 12) |
| Safety Factor: | 1.1 |
| Discharge Time : | 7 Minutes (according to 5.5.2.3 NFPA 12) |
| Concentration of CO2: | 30 % in 2 minutes and 50% in 7 minutes (according to 5.5.2.3 NFPA 12) |
| Formula : | Total CO2 required = (Vol.) x (Flooding Factor) x ( Safety Factor) |
| CO2 Required: | 1036 Kg |
| Cylinder Capacity : | 67 Lit ( 45 Kg) |
| No. of Cylinders : | 23 |
|  |  |

1. **CONCLUSION**

02

With the provision of CO2 system the summary of calculated CO2 extinguishing Media demand to protect Rooms in substation building will be as following table:

|  |  |  |
| --- | --- | --- |
| **Area** | **Total required** | **No. of Main Cylinders** |
| **Capacitor Bank room** | 140 Kg | 4 |
| **HV Room** | 767 kg | 17 |
| **LV Room** | 925 Kg | 21 |
| **Cable Gallery Room** | 1036 Kg | 23 |

Therefore total number of required cylinder for total flooding system (base on biggest volume) in this building **1036 Kg (23 Cylinders)** of CO2 gas is needed**.**