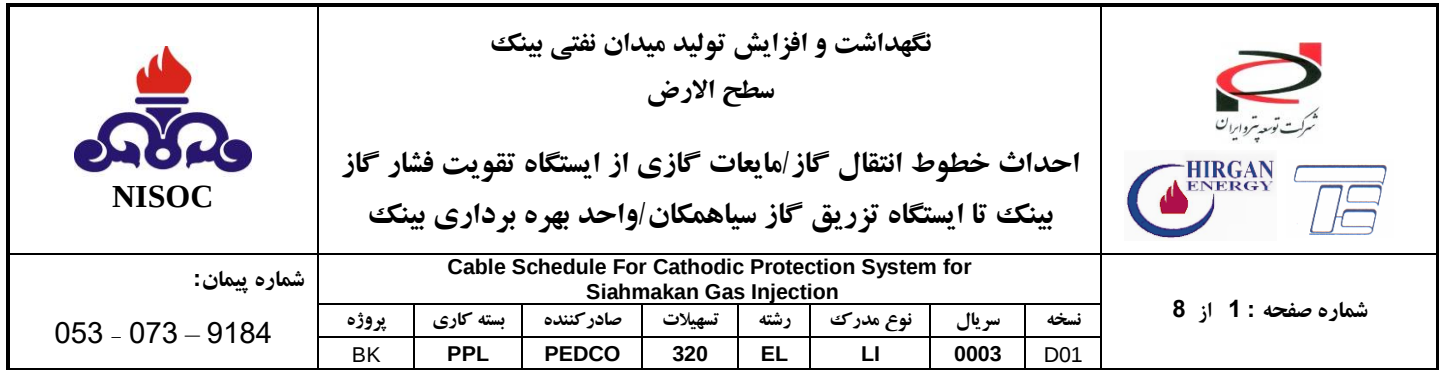




شماره پیمان:

053 - 073 - 9184

| Cable Schedule For Cathodic Protection System for Siahmakan Gas Injection |       |          |      |         |            |           |       |
|---------------------------------------------------------------------------|-------|----------|------|---------|------------|-----------|-------|
| نسخه                                                                      | سریال | نوع مدرک | رشته | تسهيلات | صادر کننده | بسته کاری | پروژه |
| D01                                                                       | 0003  | LI       | EL   | 320     | PEDCO      | PPL       | BK    |

طرح نگهداشت و افزایش تولید 27 مخزن

**Cable Schedule For Cathodic Protection System for  
Siahmakan Gas Injection**

نگهداشت و افزایش تولید میدان نفتی بینک

|          |                                |
|----------|--------------------------------|
| Class: 3 | CLIENT Doc. Number: F0Z-708643 |
|----------|--------------------------------|

**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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| <br>NISOC | <p>نگهداشت و افزایش تولید میدان نفتی بینک<br/>سطح الارض</p> <p>احداث خطوط انتقال گاز/مایعات گازی از ایستگاه تقویت فشار گاز<br/>بینک تا ایستگاه تزریق گاز سیاهمکان/واحد بهره برداری بینک</p> |           |            |         |      |          |       |  |
| شماره پیمان:<br><br>053 - 073 - 9184                                                       | Cable Schedule For Cathodic Protection System for<br>Siahmakan Gas Injection                                                                                                                |           |            |         |      |          |       | شماره صفحه : 2 از 8                                                                 |
|                                                                                            | پروژه                                                                                                                                                                                       | بسته کاری | صادر کننده | تسهیلات | رشته | نوع مدرک | سریال |                                                                                     |
|                                                                                            | BK                                                                                                                                                                                          | PPL       | PEDCO      | 320     | EL   | LI       | 0003  | D01                                                                                 |

### REVISION RECORD SHEET

| PAGE | D00 | D01 | D02 | D03 | D04 |
|------|-----|-----|-----|-----|-----|
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| <br>NISOC | <p>نگهداشت و افزایش تولید میدان نفتی بینک<br/>سطح الارض</p> <p>احداث خطوط انتقال گاز/مایعات گازی از ایستگاه تقویت فشار گاز<br/>بینک تا ایستگاه تزریق گاز سیاهمکان/واحد بهره برداری بینک</p>                                                                                                                                                                             |  |      |         |           |           |       |  |  |      |       |          |      |         |           |           |       |     |      |    |    |     |       |     |    |                     |
|--------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|------|---------|-----------|-----------|-------|--|--|------|-------|----------|------|---------|-----------|-----------|-------|-----|------|----|----|-----|-------|-----|----|---------------------|
| شماره پیمان:<br>053 - 073 - 9184                                                           | <table><tr><th colspan="8">Cable Schedule For Cathodic Protection System for<br/>Siahmakan Gas Injection</th></tr><tr><th>نسخه</th><th>سریال</th><th>نوع مدرک</th><th>رشته</th><th>تسهیلات</th><th>صادرکننده</th><th>بسته کاری</th><th>پروژه</th></tr><tr><td>D01</td><td>0003</td><td>LI</td><td>EL</td><td>320</td><td>PEDCO</td><td>PPL</td><td>BK</td></tr></table> | Cable Schedule For Cathodic Protection System for<br>Siahmakan Gas Injection        |      |         |           |           |       |  |  | نسخه | سریال | نوع مدرک | رشته | تسهیلات | صادرکننده | بسته کاری | پروژه | D01 | 0003 | LI | EL | 320 | PEDCO | PPL | BK | شماره صفحه : 3 از 8 |
| Cable Schedule For Cathodic Protection System for<br>Siahmakan Gas Injection               |                                                                                                                                                                                                                                                                                                                                                                         |                                                                                     |      |         |           |           |       |  |  |      |       |          |      |         |           |           |       |     |      |    |    |     |       |     |    |                     |
| نسخه                                                                                       | سریال                                                                                                                                                                                                                                                                                                                                                                   | نوع مدرک                                                                            | رشته | تسهیلات | صادرکننده | بسته کاری | پروژه |  |  |      |       |          |      |         |           |           |       |     |      |    |    |     |       |     |    |                     |
| D01                                                                                        | 0003                                                                                                                                                                                                                                                                                                                                                                    | LI                                                                                  | EL   | 320     | PEDCO     | PPL       | BK    |  |  |      |       |          |      |         |           |           |       |     |      |    |    |     |       |     |    |                     |

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|  | <p>نگهداشت و افزایش تولید میدان نفتی بینک<br/>سطح الارض</p> <p>احداث خطوط انتقال گاز/مایعات گازی از ایستگاه تقویت فشار گاز<br/>بینک تا ایستگاه تزریق گاز سیاهمکان/واحد بهره برداری بینک</p>                                                                                                                                                                              |  |         |      |          |       |      |  |  |       |           |            |         |      |          |       |      |    |     |       |     |    |    |      |     |                     |
|-----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------|------|----------|-------|------|--|--|-------|-----------|------------|---------|------|----------|-------|------|----|-----|-------|-----|----|----|------|-----|---------------------|
| شماره پیمان:<br><br>053 - 073 - 9184                                              | <table><tr><th colspan="8">Cable Schedule For Cathodic Protection System for<br/>Siahmakan Gas Injection</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>PPL</td><td>PEDCO</td><td>320</td><td>EL</td><td>LI</td><td>0003</td><td>D01</td></tr></table> | Cable Schedule For Cathodic Protection System for<br>Siahmakan Gas Injection        |         |      |          |       |      |  |  | پروژه | بسته کاری | صادر کننده | تسهیلات | رشته | نوع مدرک | سریال | نسخه | BK | PPL | PEDCO | 320 | EL | LI | 0003 | D01 | شماره صفحه : 4 از 8 |
| Cable Schedule For Cathodic Protection System for<br>Siahmakan Gas Injection      |                                                                                                                                                                                                                                                                                                                                                                          |                                                                                     |         |      |          |       |      |  |  |       |           |            |         |      |          |       |      |    |     |       |     |    |    |      |     |                     |
| پروژه                                                                             | بسته کاری                                                                                                                                                                                                                                                                                                                                                                | صادر کننده                                                                          | تسهیلات | رشته | نوع مدرک | سریال | نسخه |  |  |       |           |            |         |      |          |       |      |    |     |       |     |    |    |      |     |                     |
| BK                                                                                | PPL                                                                                                                                                                                                                                                                                                                                                                      | PEDCO                                                                               | 320     | EL   | LI       | 0003  | D01  |  |  |       |           |            |         |      |          |       |      |    |     |       |     |    |    |      |     |                     |

## 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, New Gas/Condensate Pipelines (from Binak New GCS to Siahmakan GIS/Binak PU) shall be constructed.

### GENERAL DEFINITION

The following terms shall be used in this document.

|                              |                                                                                                                     |
|------------------------------|---------------------------------------------------------------------------------------------------------------------|
| CLIENT:                      | National Iranian South Oilfields Company (NISOC)                                                                    |
| PROJECT:                     | Binak Oilfield Development – Surface Facilities; Gas & Gas-Condensate Pipelines                                     |
| 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 COMPANY (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 COMPANY 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 خطوط انتقال گاز/مایعات گازی از ایستگاه تقویت فشار گاز<br/>بینک تا ایستگاه تزریق گاز سیاهمکان/واحد بهره برداری بینک</p> |           |            |         |      |          |       |  |
| شماره پیمان:<br><br>053 - 073 - 9184                                              | Cable Schedule For Cathodic Protection System for<br>Siahmakan Gas Injection                                                                                                                |           |            |         |      |          |       | شماره صفحه : 5 از 8                                                                 |
|                                                                                   | پروژه                                                                                                                                                                                       | بسته کاری | صادر کننده | تسهیلات | رشته | نوع مدرک | سریال |                                                                                     |
|                                                                                   | BK                                                                                                                                                                                          | PPL       | PEDCO      | 320     | EL   | LI       | 0003  | D01                                                                                 |

## 2.0 SCOPE

This document covers Cable Cutting of connections cables in junction boxes of cathodic protection system of UG pipeline section from Gas Compressor station to Gas injection facility.

It shall be used in conjunction with data/requisition sheets for present document subject.

## 3.0 NORMATIVE REFERENCES

### 3.1 LOCAL CODES AND STANDARDS

- IPS-E-TP-820 Engineering Standard for Electrochemical Protection
- IPS-C-TP-820 Construction Standard for Cathodic Protection
- IPS-I-TP-820: Inspection Standard for Monitoring Cathodic Protection
- IPS-M-TP-750 Material and Equipment Standard For Cathodic Protection

### 3.2 INTERNATIONAL CODES AND STANDARDS

- ASTM American Society for Testing Materials Relevant Parts
- API 610 Centrifugal Pumps for General Refinery Service, 10th Edition
- NACE SP 0169 Control of External Corrosion on Underground or Submerged Metallic Piping System.
- NACE-SP 0286 The Electrical Isolation of Cathodically Protected Pipelines.
- BS 7361(1991) Cathodic Protection Part 1. Code of Practice for Land and Marine Applications.
- NACE SP 0177 Mitigation of Alternating Current and Lightning Effects on Metallic Structures and Corrosion Control Systems.
- ISO 15589,1-2 Cathodic protection of pipeline transportation systems
- NACE SP 0502 External corrosion direct assessment (ECDA) process — assessing and reducing the impact of external corrosion on pipeline integrity.
- NACE SP 0207 Performing Close-Interval Potential Surveys and DC Surface Potential Gradient Surveys on Buried or Submerged Metallic Pipelines.

|                                                                                            |                                                                                                                                                                                             |           |            |         |      |          |       |                                                                                     |      |
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| <br>NISOC | <p>نگهداشت و افزایش تولید میدان نفتی بینک<br/>سطح الارض</p> <p>احداث خطوط انتقال گاز/مایعات گازی از ایستگاه تقویت فشار گاز<br/>بینک تا ایستگاه تزریق گاز سیاهمکان/واحد بهره برداری بینک</p> |           |            |         |      |          |       |  |      |
| شماره پیمان:<br><br>053 - 073 - 9184                                                       | Cable Schedule For Cathodic Protection System for<br>Siahmakan Gas Injection                                                                                                                |           |            |         |      |          |       | شماره صفحه : 6 از 8                                                                 |      |
|                                                                                            | پروژه                                                                                                                                                                                       | بسته کاری | صادر کننده | تسهیلات | رشته | نوع مدرک | سریال |                                                                                     | نسخه |
|                                                                                            | BK                                                                                                                                                                                          | PPL       | PEDCO      | 320     | EL   | LI       | 0003  | D01                                                                                 |      |

- NACE-SP0104 The Use of Coupons for Cathodic Protection Monitoring Applications

### 3.3 THE PROJECT DOCUMENTS

- BK-GCS-PEDCO-120-EL-CN-0008 Specification for Cathodic Protection System
- BK-GNRAL-PEDCO-HD-000-EL-DC-0001 Electrical System Design Criteria
- BK- GCS - PEDCO -320-GT-RT-0001 Geotechnical Report

### 3.4 ENVIRONMENTAL DATA

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

Cathodic Protection System shall be designed for use under the conditions specified as below:

Ambient temperatures for equipment:

|                                                             |                         |
|-------------------------------------------------------------|-------------------------|
| Maximum design temperature indoor/outdoor (under sun shade) | +55°C                   |
| Minimum design temperature                                  | -5°C                    |
| Maximum surface temperature exposed to the sun              | 85°C                    |
| Maximum relative humidity                                   | 100%                    |
| Altitude                                                    | <1000m above sea Level  |
| Special Atmospheric Condition                               | dust and salt corrosive |

For the ambient conditions special care will be paid to:

- Enclosures of equipment for outdoor installation
- Painting and coating of metal parts to resist to the severe environmental conditions
- Any environmental derating factors shall be considered by vendor before design

### 3.5 ORDER OF PRECEDENCE

In case of conflict between requirements specified herein & the requirements of any other referenced document, the most approved stringent requirements of below listed items shall be considered based on the approval given by the owner's representative:

Purchase order

Material Requisition

MTO & Data Sheet

This Specification

|                                                                                            |                                                                                                                                                                                             |           |            |         |      |          |       |                                                                                     |      |
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| <br>NISOC | <p>نگهداشت و افزایش تولید میدان نفتی بینک<br/>سطح الارض</p> <p>احداث خطوط انتقال گاز/مایعات گازی از ایستگاه تقویت فشار گاز<br/>بینک تا ایستگاه تزریق گاز سیاهمکان/واحد بهره برداری بینک</p> |           |            |         |      |          |       |  |      |
| شماره پیمان:<br><br>053 - 073 - 9184                                                       | Cable Schedule For Cathodic Protection System for<br>Siahmakan Gas Injection                                                                                                                |           |            |         |      |          |       | شماره صفحه : 7 از 8                                                                 |      |
|                                                                                            | پروژه                                                                                                                                                                                       | بسته کاری | صادر کننده | تسهیلات | رشته | نوع مدرک | سریال |                                                                                     | نسخه |
|                                                                                            | BK                                                                                                                                                                                          | PPL       | PEDCO      | 320     | EL   | LI       | 0003  | D01                                                                                 |      |

Drawing & Other Specification

Reference Project Specification

Iranian Petroleum Standard (IPS)

Reference international Code & Standards

When the term “Authorized”, Authorization”, “Approval”, or “Approved” are used in this specification, it shall mean authorization or Approval from OWNER.

In case of any conflict between the project documents, the most stringent one shall be considered.

#### 4.0 CABLE SCHEDULE OF CP SYSTEM

| ID | Cable Tag                                                                 | From                            | To                             | Cable Size (mm <sup>2</sup> ) | Cable Length (m) | Cable Type         | Over Sheath Color |
|----|---------------------------------------------------------------------------|---------------------------------|--------------------------------|-------------------------------|------------------|--------------------|-------------------|
| 1  | TR-PBB-P-001                                                              | TR-P-Binak-001                  | PBB-P-001                      | 1×50                          | 100              | Cu/XLPE/Bd/AWA/PVC | Red               |
| 2  | TR-NBB-P-001                                                              |                                 | NBB-P-001                      | 1×50                          | 20               | Cu/XLPE/Bd/AWA/PVC | Black             |
| 3  | TR-PBB-P-002                                                              | TR-P-Siamakan-002               | PBB-P-002                      | 1×50                          | 400              | Cu/XLPE/Bd/AWA/PVC | Red               |
| 4  | TR-NBB-P-002                                                              |                                 | NBB-P-002                      | 1×50                          | 20               | Cu/XLPE/Bd/AWA/PVC | Black             |
| 5  | PBB-PF-P-001                                                              | PBB-P-001                       | 2 Header Anode Cable for GB 01 | 1×35                          | 225              | Cu/XLPE/Bd/PVC     | Red               |
| 6  | PBB-PF-P-002                                                              | PBB-P-002                       | 2 Header Anode Cable for GB 02 | 1×35                          | 225              | Cu/XLPE/Bd/PVC     | Red               |
| 7  | NBB-NC-P-001                                                              | NBB-P-001                       | 8"-Pipeline                    | 1×35                          | 25               | Cu/XLPE/Bd/PVC     | Black             |
| 8  | NBB-NC-P-002                                                              |                                 | 8"-Pipeline                    | 1×35                          | 25               | Cu/XLPE/Bd/PVC     | Black             |
| 9  | NBB-NC-P-003                                                              | NBB-P-002                       | 8"-Pipeline                    | 1×35                          | 25               | Cu/XLPE/Bd/PVC     | Black             |
| 10 | NBB-NC-P-004                                                              |                                 | 8"-Pipeline                    | 1×35                          | 25               | Cu/XLPE/Bd/PVC     | Black             |
| 11 | TC-P-001 ~045                                                             | 8"-Pipeline                     | TB-P-001~045                   | 1×16                          | 5                | Cu/XLPE/Bd/PVC     | Black             |
| 12 | TC-CR-P-001~012<br>(Each Lines shall be connected via 2 separated cables) | 8" Pipeline & Foreign Structure | TBC-P-001~006                  | 1×16                          | 5                | Cu/XLPE/Bd/PVC     | Black             |

#### Abbreviations:

AJB : Anode Junction Box

NCB : Negative Connection Box

TB : Test Box

NBB : Negative Bonding Box

TR : Transformer Rectifier

|                                                                                   |                                                                                                                                                                                             |           |           |         |      |          |       |                                                                                     |      |
|-----------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|-----------|---------|------|----------|-------|-------------------------------------------------------------------------------------|------|
|  | <p>نگهداشت و افزایش تولید میدان نفتی بینک<br/>سطح الارض</p> <p>احداث خطوط انتقال گاز/مایعات گازی از ایستگاه تقویت فشار گاز<br/>بینک تا ایستگاه تزریق گاز سیاهمکان/واحد بهره برداری بینک</p> |           |           |         |      |          |       |  |      |
| شماره پیمان:<br><br>053 - 073 - 9184                                              | Cable Schedule For Cathodic Protection System for<br>Siahmakan Gas Injection                                                                                                                |           |           |         |      |          |       | شماره صفحه : 8 از 8                                                                 |      |
|                                                                                   | پروژه                                                                                                                                                                                       | بسته کاری | صادرکننده | تسهیلات | رشته | نوع مدرک | سریال |                                                                                     | نسخه |
|                                                                                   | BK                                                                                                                                                                                          | PPL       | PEDCO     | 320     | EL   | LI       | 0003  |                                                                                     | D01  |

RE : Reference Electrode

GB : Ground Bed

NC : Negative Connection

TC : Test Connection

CR : Crossing Line

F : Foreign Structure

P : Power Cable / Cathodic Cable

SP : Spare

PF : Power feed header cable anode for GB

Target Line : 8" pipeline