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|-----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|---------|------|----------|-------|-------------------------------------------------------------------------------------|--|--|
|  | نگهداشت و افزایش تولید میدان نفتی بینک<br>سطح الارض و ابنیه تحت الارض<br><br>خرید پکیج کولرهای هوایی ایستگاه تقویت فشار گاز بینک<br>(قرارداد BK-HD-GCS-CO-0015_02) |           |         |      |          |       |  |  |  |
|                                                                                   | شماره پیمان: 053-073-9184                                                                                                                                          |           |         |      |          |       | شماره صفحه: 1 از 6                                                                  |  |  |
| Process Data Sheet for AE-2101 (A/B/C)                                            |                                                                                                                                                                    |           |         |      |          |       |                                                                                     |  |  |
| پروژه                                                                             | بسته کاری                                                                                                                                                          | صادرکننده | تسهیلات | رشته | نوع مدرک | سریال | نسخه                                                                                |  |  |
| BK                                                                                | GCS                                                                                                                                                                | AA        | 120     | PR   | DS       | 0001  | V05                                                                                 |  |  |

طرح نگهداشت و افزایش تولید 27 مخزن

Process Data Sheet for AE-2101 (A/B/C)

نگهداشت و افزایش تولید میدان نفتی بینک

|      |          |                         |              |             |               |                 |
|------|----------|-------------------------|--------------|-------------|---------------|-----------------|
| V05  | Jan.2025 | AFC                     | AAC          | M.FAKHARIAN | S.FRAMARZPOUR |                 |
| V04  | Nov.2024 | AFC                     | AAC          | M.FAKHARIAN | M.SADEGHIAN   |                 |
| V03  | Oct.2024 | IFA                     | AAC          | M.FAKHARIAN | M.SADEGHIAN   |                 |
| V02  | Aug.2024 | IFA                     | AAC          | M.FAKHARIAN | M.SADEGHIAN   |                 |
| V01  | Mar.2024 | IFA                     | AAC          | M.FAKHARIAN | S.FRAMARZPOUR |                 |
| V00  | Nov.2023 | IFA                     | AAC          | M.FAKHARIAN | S.FRAMARZPOUR |                 |
| Rev. | Date     | Purpose of Issue/Status | Prepared by: | Checked by: | Approved by:  | CLIENT Approval |

**Status:**

IFA: Issued For Approval  
IFI: Issued For Information  
AFC: Approved For Construction

|                                                                                   |                                                                                                                                                                               |           |                                                                                     |      |          |       |      |
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|  | نگهداشت و افزایش تولید میدان نفتی بینک<br>سطح الارض و ابنیه تحت الارض<br><br><b>خرید پکیج کولرهای هوایی ایستگاه تقویت فشار گاز بینک</b><br><b>(قرارداد 02_0015-GCS-HD-BK)</b> |           |  |      |          |       |      |
|                                                                                   | <b>شماره پیمان:</b><br>053-073-9184                                                                                                                                           |           | <b>شماره صفحه: 2 از 6</b>                                                           |      |          |       |      |
| <b>Process Data Sheet for AE-2101 (A/B/C)</b>                                     |                                                                                                                                                                               |           |                                                                                     |      |          |       |      |
| پروژه                                                                             | بسته کاری                                                                                                                                                                     | صادرکننده | تسهیلات                                                                             | رشته | نوع مدرک | سریال | نسخه |
| BK                                                                                | GCS                                                                                                                                                                           | AA        | 120                                                                                 | PR   | DS       | 0001  | V05  |

### REVISION RECORD SHEET

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| <br>NISOC | نگهداشت و افزایش تولید میدان نفتی بینک<br>سطح الارض و ابنیه تحت الارض<br><br>خرید پکیج کولرهای هوایی ایستگاه تقویت فشار گاز بینک<br>(قرارداد BK-HD-GCS-CO-0015_02)                                                                                                                                                            |  |      |         |           |           |       |  |  |      |       |          |      |         |           |           |       |     |      |    |    |     |    |     |    |                     |
|--------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|------|---------|-----------|-----------|-------|--|--|------|-------|----------|------|---------|-----------|-----------|-------|-----|------|----|----|-----|----|-----|----|---------------------|
| شماره پیمان:<br>053 – 073 – 9184                                                           | <table><tr><th colspan="8">Process Data Sheet for AE-2101 (A/B/C)</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>V05</td><td>0001</td><td>DS</td><td>PR</td><td>120</td><td>AA</td><td>GCS</td><td>BK</td></tr></table> | Process Data Sheet for AE-2101 (A/B/C)                                              |      |         |           |           |       |  |  | نسخه | سریال | نوع مدرک | رشته | تسهیلات | صادرکننده | بسته کاری | پروژه | V05 | 0001 | DS | PR | 120 | AA | GCS | BK | شماره صفحه : 3 از 6 |
| Process Data Sheet for AE-2101 (A/B/C)                                                     |                                                                                                                                                                                                                                                                                                                               |                                                                                     |      |         |           |           |       |  |  |      |       |          |      |         |           |           |       |     |      |    |    |     |    |     |    |                     |
| نسخه                                                                                       | سریال                                                                                                                                                                                                                                                                                                                         | نوع مدرک                                                                            | رشته | تسهیلات | صادرکننده | بسته کاری | پروژه |  |  |      |       |          |      |         |           |           |       |     |      |    |    |     |    |     |    |                     |
| V05                                                                                        | 0001                                                                                                                                                                                                                                                                                                                          | DS                                                                                  | PR   | 120     | AA        | GCS       | BK    |  |  |      |       |          |      |         |           |           |       |     |      |    |    |     |    |     |    |                     |

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| <br>NISOC | <p>نگهداشت و افزایش تولید میدان نفتی بینک<br/>سطح الارض و ابنیه تحت الارض</p> <p>خرید پکیج کولرهای هوایی ایستگاه تقویت فشار گاز بینک<br/>(قرارداد BK-HD-GCS-CO-0015_02)</p> |           |            |         |      |          |       |  |      |
| شماره پیمان:<br>053 – 073 – 9184                                                           | Process Data Sheet for AE-2101 (A/B/C)                                                                                                                                      |           |            |         |      |          |       | شماره صفحه : 4 از 6                                                                 |      |
|                                                                                            | پروژه                                                                                                                                                                       | بسته کاری | صادر کننده | تسهیلات | رشته | نوع مدرک | سریال |                                                                                     | نسخه |
|                                                                                            | BK                                                                                                                                                                          | GCS       | AA         | 120     | PR   | DS       | 0001  |                                                                                     | V05  |

## 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.

### GENERAL DEFINITION

The following terms shall be used in this document.

|                              |                                                                                                                      |
|------------------------------|----------------------------------------------------------------------------------------------------------------------|
| CLIENT:                      | National Iranian South Oilfields Company (NISOC)                                                                     |
| PROJECT:                     | Binak Oilfield Development – Manufacturing (w/Engineering & Material Supply) of Air Coolers                          |
| EPD/EPC CONTRACTOR (GC):     | Petro Iran Development Company (PEDCO)                                                                               |
| OWNER:                       | OWNER is collectively refer to National Iranian South Oil Company (NISOC) and Petro Iran Development Company (PEDCO) |
| EPC CONTRACTOR:              | Joint Venture of : Hirgan Energy – Design & Inspection(D&I) Companies                                                |
| VENDOR:                      | Aban Air Cooler (AAC)                                                                                                |
| EXECUTOR:                    | Executor is the party which carries out all or part of construction and/or commissioning for the project.            |
| THIRD PARTY INSPECTOR (TPI): | Third Party Inspector                                                                                                |
| 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.                                                               |







نگهداشت و افزایش تولید میدان نفتی بینک  
سطح الارض و ابنیه تحت الارض

خرید پکیج کولرهای هوایی ایستگاه تقویت فشار گاز بینک  
(قرارداد 02 BK-HD-GCS-CO-0015)



شماره پیمان:  
053 - 073 - 9184

### Process Data Sheet for AE-2101 (A/B/C)

| نسخه | سریال | نوع مدرک | رشته | تسهیلات | صادرکننده | بسته کاری | پروژه |
|------|-------|----------|------|---------|-----------|-----------|-------|
| V05  | 0001  | DS       | PR   | 120     | AA        | GCS       | BK    |

شماره صفحه : 6 از 6

| rev.                                                                                                                                                                                      | AAC                              | DATA SHEET<br>AIR COOLED HEAT EXCHANGER<br>ABAN AIR COOLER CO | Date : 2025.26.Jan<br>Rev : 5<br>CASE: 00012-AC-3991<br>Item no.: AE-2101 (A/B/C)<br>Winter case |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|---------------------------------------------------------------|--------------------------------------------------------------------------------------------------|
| Customer / Purch.                                                                                                                                                                         | (PEDCO) / (NISOC)                |                                                               |                                                                                                  |
| Plant location                                                                                                                                                                            | Binak oilfield                   |                                                               |                                                                                                  |
| Service                                                                                                                                                                                   | 1st Stage Gas Compression Cooler |                                                               | No. Units: 3                                                                                     |
| Plot size(W,L) [m]                                                                                                                                                                        | 1.97 x 3.8 (note2)               | DRAFT INDUCED                                                 | No. of bay: 1                                                                                    |
| Surface / unit-Finned                                                                                                                                                                     | 668.71 [m2]                      | Bare Tube                                                     | 31.536 [m2]                                                                                      |
| Heat exchanged                                                                                                                                                                            | 276 (Note 1,9) [KW]              | MTD                                                           | 26.3 [C]                                                                                         |
| Transf. rate-finned                                                                                                                                                                       | 19.37 [W/m2 ,k]                  | Bare Tube (C/D)                                               | 458.48 / 410.75 [W/m2k]                                                                          |
| PRODUCT SIDE                                                                                                                                                                              |                                  |                                                               |                                                                                                  |
| Fluid Name                                                                                                                                                                                | Hydrocarbon                      | IN                                                            | OUT                                                                                              |
| Total Fluid [kg/h]                                                                                                                                                                        | 7585 x 1.1 (note 1)              | Density (Liq)                                                 | 12.847 [kg/m3]                                                                                   |
| Temperature [C]                                                                                                                                                                           | 116                              | Density (vap)                                                 | 14.916 [kg/m3]                                                                                   |
| Vapor [kg/h]                                                                                                                                                                              | 8343.5                           | Spec.Heat (Liq)                                               | kJ/(kg.°C)                                                                                       |
| Liquid [kg/h]                                                                                                                                                                             |                                  | Spec.Heat (vap)                                               | 2.2197 kJ/(kg.°C)                                                                                |
| N condensed [kg/h]                                                                                                                                                                        |                                  | Conduct. (Liq)                                                | 2.029 [W/Mk]                                                                                     |
| Steam [kg/h]                                                                                                                                                                              |                                  | Conduct. (vap)                                                | 0.0441 [W/Mk]                                                                                    |
| Water [kg/h]                                                                                                                                                                              |                                  | Viscosity (Liq)                                               | 0.0356 [cp]                                                                                      |
| Inlet pressure [barg]                                                                                                                                                                     | 17.9 (note 6)                    | Viscosity (Vap)                                               | 0.0137 [cp]                                                                                      |
| Fouling resist.[m2.k/w]                                                                                                                                                                   | 0.0002                           | Velocity                                                      | 0.0121 [m/s]                                                                                     |
|                                                                                                                                                                                           |                                  | Allo/Calc. Press.Drop                                         | 18.09 / 15.58 [bar]                                                                              |
| AIR SIDE                                                                                                                                                                                  |                                  |                                                               |                                                                                                  |
| AirQuantity, Total                                                                                                                                                                        | 24.14 [m3/s]                     | Face Velocity:                                                | 2.9 [m/s]                                                                                        |
| AirQuant./Fan                                                                                                                                                                             | 12.07 [m3/s]                     | Altit. / Min. Des.Amb.:                                       | 12.5 / 5 [m]/[C]                                                                                 |
| Static pressure                                                                                                                                                                           | 137.4 [Pa]                       | Temp.In / Out :                                               | 50.26 / 61.02 [C]                                                                                |
| DESIGN                                                                                                                                                                                    |                                  |                                                               |                                                                                                  |
| Design pressure                                                                                                                                                                           | 22 [Barg]                        | Code Requirements                                             | ASME VIII DIV.1 ; API 661                                                                        |
| Design temperature                                                                                                                                                                        | 155 [C]                          | TUBE                                                          |                                                                                                  |
| Test pressure                                                                                                                                                                             | 28.60 [Barg]                     | Material                                                      | SA-213 TP316L                                                                                    |
| BAY width [m]                                                                                                                                                                             | 1.97                             | Outside Diameter                                              | 25.4 [mm]                                                                                        |
| Bundle Size                                                                                                                                                                               | 1.92 x 3.8                       | Wall Thickness                                                | 1.651 [mm]                                                                                       |
| N .Bay                                                                                                                                                                                    | 1                                | N ./Bundle                                                    | 104                                                                                              |
| N .Bundles / Bay                                                                                                                                                                          | 1                                | Length                                                        | 3.8 [m]                                                                                          |
| N .Tube Rows                                                                                                                                                                              | 4                                | Pitch                                                         | 63.5 [mm]                                                                                        |
| N .Passes                                                                                                                                                                                 | 4                                | FIN                                                           |                                                                                                  |
| Tube slope                                                                                                                                                                                | 1% on Last pass                  | Type                                                          | EXTRUDED                                                                                         |
| HEADER                                                                                                                                                                                    |                                  | Material                                                      | ALUMINIUM alloy 1060 - O                                                                         |
| Type                                                                                                                                                                                      | Plug                             | Outside Diameter                                              | 57.15 [mm]                                                                                       |
| Material                                                                                                                                                                                  | SA-240 TP316L                    | Stock Thick.                                                  | 0.48 [mm]                                                                                        |
| Header Design / SPLIT                                                                                                                                                                     | Shoulder/No                      | FPM                                                           | 400                                                                                              |
| Plug Mat                                                                                                                                                                                  | SA 182 F316L                     | MISCELLANEOUS                                                 |                                                                                                  |
| Gasket Mat                                                                                                                                                                                | Solid Metal                      | Structural Mounting                                           | Ground                                                                                           |
| Corrosion Allow.                                                                                                                                                                          | 0 [mm]                           | Bundle Frame                                                  | H.D.G                                                                                            |
| Qty / Size nozzle IN                                                                                                                                                                      | 1 X 6" (80S)                     | Louvers                                                       | Yes, (Manual)                                                                                    |
| Qty / Size nozzle OUT                                                                                                                                                                     | 1 X 6" (80S)                     | Vibration switches                                            | Yes, EExd, IIB T3 (IP 65)                                                                        |
| Rating & Facing (in/out)                                                                                                                                                                  | 300 RF                           | Steam Coil                                                    | No                                                                                               |
| T/PI                                                                                                                                                                                      | Yes (2") / Yes (2")              | Recirculation System                                          | No                                                                                               |
| Vent / Drain                                                                                                                                                                              | Yes (2") / Yes (2") LWN #300     | Tube / Tubesheet Connection.                                  | Expanded + Strength weld                                                                         |
| MECH. EQUIPMENT                                                                                                                                                                           |                                  |                                                               |                                                                                                  |
| FAN                                                                                                                                                                                       |                                  | ELECTRIC MOTOR                                                |                                                                                                  |
| N ./Bay                                                                                                                                                                                   | 2                                | N ./Bay                                                       | 2                                                                                                |
| N .autovvariable/bay                                                                                                                                                                      | 50%                              | KW / Driver                                                   | 5.5                                                                                              |
| rev / min                                                                                                                                                                                 | 626.4                            | rev / min                                                     | 1500                                                                                             |
| Diameter                                                                                                                                                                                  | 1372 (4.5 FT) mm                 | Enclosure                                                     | EExd, IIB T3 (IP 55)                                                                             |
| N .Blades                                                                                                                                                                                 | 4                                | Volt, Phase, Cycle                                            | 400-3-50                                                                                         |
| Material, Blade                                                                                                                                                                           | AL                               | SPEED REDUCER                                                 |                                                                                                  |
| Material, Hub                                                                                                                                                                             | Steel/Alu                        | Type                                                          | V-Belt                                                                                           |
| KW / Fan, Absorb.                                                                                                                                                                         | 2.6                              | N .Bay                                                        | 2                                                                                                |
| Type of fan Ring                                                                                                                                                                          | Flanged                          | Service Factor                                                | 1.8                                                                                              |
| SPI @ 1m beside fan                                                                                                                                                                       | ≤85 [dB(A)]                      | Ratio                                                         | 2.39                                                                                             |
| NOTES:                                                                                                                                                                                    |                                  |                                                               |                                                                                                  |
| 1- 10% over design on duty / flow has been considered.                                                                                                                                    |                                  |                                                               |                                                                                                  |
| 2- Plot size is without considering side walkways.                                                                                                                                        |                                  |                                                               |                                                                                                  |
| 3- Air side fouling factor has been considered equal to 0.00035 m2.K/w.                                                                                                                   |                                  |                                                               |                                                                                                  |
| 4- Thechnical Bid is in compliance with NACE MR 0175/ISO 15156 and Technical Specification for Material Requirements in Sour service Doc. No. BK-GNRAL-PEDCO-000-PI-SP-0008, IPS-MPM-200. |                                  |                                                               |                                                                                                  |
| 5- Maximum allowable nozzle load = 3 x API.                                                                                                                                               |                                  |                                                               |                                                                                                  |
| 6-Physical properties changed based on last revision of PFD Doc.No:BK-GCS-HY-120-PR-PF-0001-V04-AP                                                                                        |                                  |                                                               |                                                                                                  |
| 7-Deleted                                                                                                                                                                                 |                                  |                                                               |                                                                                                  |
| 8-Primarily fan data sheet is attached and final fan data sheet will be submitted after subvondor finalization.                                                                           |                                  |                                                               |                                                                                                  |