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| **طرح نگهداشت و افزایش تولید 27 مخزن** |
| **INSPECTION & TEST PLAN (ITP)****نگهداشت و افزایش تولید میدان نفتی بینک** |
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| 01 | NOV. 2022 | IFA | Havayar Co. | Havayar Co. | Havayar Co. |  |
| 00 | OCT. 2022 | IFC | Havayar Co. | Havayar Co. | Havayar Co. |  |
| **Rev.** | **Date** | **Purpose of Issue/Status** | **Prepared by:** | **Checked by:** | **Approved by:** | **CLIENT Approval** |
| **Class: 1** |
| **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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| **2** | X | X |  |  |  | **67** |  |  |  |  |  |
| **3** | X |  |  |  |  | **68** |  |  |  |  |  |
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| **11** | X | X |  |  |  | **76** |  |  |  |  |  |
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| **13** | X | X |  |  |  | **78** |  |  |  |  |  |
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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.

**GENERAL DEFINITION**

The following terms shall be used in this document.

|  |  |
| --- | --- |
| CLIENT:  | National Iranian South Oilfields Company (NISOC)  |
| PROJECT: | Binak Oilfield Development – General Facilities |
| EPD/EPC CONTRACTOR (GC):  | Petro Iran Development Company (PEDCO) |
| EPC CONTRACTOR: | Joint Venture of : Hirgan Energy – Design & Inspection(D&I) Companies |
| VENDOR: | Havayar Company |
| 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**

This document contains necessary inspection requirements for PROJECT Reciprocating Compressors.

1. **ABBREVIATIONS**

|  |  |
| --- | --- |
| PIM  | Pre Inspection Meeting  |
| MOM  | Minutes of Meeting  |
| FAT  | Factory Acceptance Test  |
| SAT  | Site Acceptance Test  |
| MTC  | Material Test Certificate  |
| ITP  | Inspection & Test Plan  |
| NCR  | Non Conformance Report  |
| QC  | Quality Control  |
| MR  | Material Requisition  |
| VPIS | Vendor Print Index Schedule |
| DWG  | Drawing  |
| APP  | Approved  |
| Assy.  | Assembly  |
| MFG  | Manufacturing  |
| NDT  | Non-Destructive Testing  |
| WPS  | Welding Procedure Specification  |
| WQT  | Welder Qualification Test Report  |
| GA  | General Arrangement  |
| PQR | Procedure Qualification Report |
| Ref. | Reference |
| STD | Standard |
| THK. | Thickness |
| IRN:  | Inspection Release Note  |

1. **DESCRIPTIONS**

H: (Hold Point)

Next operation is allowed only when test or inspection is accepted.

Vendor must notify contractor of the dedicated inspection activity at least 10 days in advance in accordance with IA. And the test must be performed in attendance of the inspectors; the vendor

shall not depart from this role unless specifically approved by contractor in writing.

W: (Witness Point)

Inspector’s presence required, the inspection activity proceed if the involved parties does not attend in accordance with IA.

The vendor must notify contractor of the dedicated inspection activity at least 10 days in advance if the inspection parties don't elect to be present, the vendor may proceed with his own inspection provide and test records are made available to contractor for review

SW: (Spot Witness Point)

Inspector's presence required, the inspection activity proceed if the involved parties does not attend, the ratio of witness point is minimum 20%.

The vendor must notify contractor of the dedicated inspection schedule at least 14 days in advance in accordance with IA. if the inspection parties don't elect to be present, the vendor may proceed with his own inspection provide and test records are made available to contractor for review

R: (Review of Documents)

Check of certificate and/or documents with approved procedures, specification and acceptance criteria.

R/A: ( Review and Approved of Documents)

Check and approve of certificate and/or documents with approved procedures, specification and acceptance criteria.

1. **ITP**

| **ITP No.** | **Part Name / Activity** | **Characteristic to Be Verified** | **Acceptance Criteria** | **Reference Documents** | **Verifying Document** | **Extent of Check** | **Participation By** | **Remark** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **HY** | **TPI** | **HE/DI** | **PEDCO** | **NISOC** |  |
| 1.A | PIM | --- | Spec. | Spec. | ITP/MOM | --- | H | H | H | H | H |  |
| **1- Initial Documentation** |
| 1-1 | Design & Drawing | --- | Project SPEC | --- | APP GA/P&ID | --- | R | R | R | R | R |  |
| 1-2 | WPS – PQR | --- | ASME SEC. IX | Project Specification / Ref. Standard | WPS-PQR | --- | R | R | R | R | R |  |
| 1-3 | WQT | --- | ASME SEC. IX | Project Specification / Ref. Standard | WQT | --- | R | R | R | R | R |  |
| 1-4 | NDT Procedures (VT-PT-MT-UT-RT) | --- | ASME SEC. V | Project Specification / Ref. Standard | NDT Procedure | --- | R | R | R | R | R |  |
| 1-5 | NDT Personnel Certificate | --- | ISO 9712 | ISO 9712 | NDT Personnel Certificate  | --- | R | R | R | R | R |  |
| 1-6 | Other Vendor’s QC Document (According to VPIS) Document Subject According to Client Approval | --- | Project SPEC/MR/ STANDARD | Inspection and Test Procedure, Hydrostatic test Procedure, Painting Procedure, etc. | --- | --- | R | R | R | R | R |  |
| 1-7 | Consumable Material | --- | STD.SPEC. | Project Specification / Ref. Standard  | REPORT | --- | R | R | R | R | R |  |
| **2- Test and Inspection Activities** |
| **2-1- Bare-Block** (Including: Crank Case, Crank Shaft, Connecting Rod, Cylinder, Cylinder Liner, Cross Head, Piston Rod, Piston Body) |
| 2-1-1 | Material Inspection | Chemical Comp. / Mechanical Prop. | ASTM Code | Mfg. Dwg. | MILL Certificate | --- | R | R | R | R | R |  |
| EN10204, type 3.1, NACE MR0175 |
| 2-1-2 | NDE (P.T) | Mechanical Integrity | ASME Sec. VIII Div.1API 618 | ASTM E-165 | NDE Report | 10% Machined Area | W | W | R | R | R | Cylinder |
| 2-1-3 | NDE (U.T / M.T) | Mechanical Integrity | ASME Sec. VIII Div.1API 618 | ASTM A-503ASTM E-709ASME SA-388 | NDE Report | 10% Machined Area | W | W | R | R | R | Crank Shaft, Connecting Rod, Piston Rods |
| 2-1-4 | Hardness Test | Surface Hardness | NACE MR 0175 | App. Procedure | Test Report | H2S Wetted Parts | W | R | R | R | R |  |
| 2-1-5 | Visual and Dimensional Inspection | Conformance to Design/ Spec | Mfg. Dwg. | Mfg. Dwg. | Visual & Dimensional Inspection Report | --- | H | H | R | R | R |  |
| 2-1-6 | Cylinder Helium Leak Test | Leakage | App. Procedure | App. Procedure | Test Report | --- | H | H | R | H | R |  |
| 2-1-7 | Mechanical Run Test | 1) Voltage & Current2) Rotation Speed3) Vibration Check 4) Temperature Check for Bearing | App. Procedure | App. Procedure | Test Report | --- | H | H | H | W | W |  |
| 2-1-8 | Bar-Over To Check Rod Runout | Top & Bottom Piston Clearance Check | App. Procedure | App. Procedure | Test Report | --- | H | H | H | R | R |  |
| 2-1-9 | Hydrostatic Test (Gas Side & Water Side) | Mechanical Strength | API Code & App. Procedure | App. Procedure | Pressure Test Report + Traceable Curve | --- | H | H | R | R | R | For Cylinder |
| 2-1-10 | Cylinder Valve Leak Test | Conformance to Design | Mfg. procedure. | Mfg. procedure. | Certificate of Conformance | --- | R | R | R | R | R | Cylinder Valve |
| **2-2- Lubrication/Cooling System** (Including: Oil/Water Pumps, Motors, Heaters, Filters, Valves) |
| 2-2-1 | Assembly Inspection | Component Integrity | Mfg. Dwg. | Mfg. Dwg. | Inspection Report | --- | W | W | R | R | R |  |
| 2-2-2 | Visual and Dimensional Inspection | Conformance to Design/ Spec | Mfg. Dwg. | Mfg. Dwg. | QC Report, Inspection report | --- | W | W | R | R | R |  |
| **2-3- Lube-Oil/Water Cooler** |
| 2-3-1 | Material Inspection | Chemical Comp. / Mechanical Prop. | ASTM Code | App. Dwg. | Material Certificate EN10204, type 3.1, Inspection report | --- | W | W | R | R | R |  |
| 2-3-2 | Visual and Dimensional Inspection | Conformance to Design/ Spec | App. Dwg. | App. Dwg. | QC Report, Inspection report | --- | W | R | R | R | R |  |
| 2-3-3 | Magnetic Particle / PT Examination | Mechanical Integrity | ASTM E709 | NDE Procedure/Weld Map | NDE Report, Inspection report | 10 % Machined Area | W | W | R | R | R |  |
| 2-3-4 | Radiographic Examination on Butt Weld | Mechanical Integrity | ASTM E94 | NDE Procedure/Weld Map | NDE Report | 10 % Butt weld | W | R | R | R | R |  |
| 2-3-5 | PWHT  | Heat Treatment | ASME Sec. VIII, API 618, NACE | App. Procedure. | --- | As Required | W | W | R | R | R | If applicable |
| 2-3-6 | Hydrostatic Test | Mechanical Strength | API Code & App. Procedure | App. Procedure | QC Report, Inspection report | --- | H | H | R | R | R |  |
| 2-3-7 | Painting inspection | Conformance to Design/ Spec | Project specification | App. Procedure | QC Report | --- | W | R | R | R | R |  |
| **2-4- Suction/Discharge Snubber** |
| 2-4-1 | Material Inspection | Chemical Comp. / Mechanical Prop. | ASTM Code | App. Dwg. | Material Certificate | --- | W | W | R | R | R |  |
| 2-4-2 | Weld Inspection | Mechanical Integrity | Project specification and ASME Sec. VIII | WPS/PQR | QC Report | 100 % Weld | W | R | R | R | R |  |
| 2-4-3 | Magnetic Particle /PT Examination | Mechanical Integrity | NDE Procedure + ASME Sec. VIII | NDE Procedure/Weld Map | NDE Report | 100 % Machined Area | W | W | R | R | R |  |
| 2-4-4 | Radiographic Examination | Mechanical Integrity | ASTM E94 + ASME Sec. VIII | NDE Procedure/Weld Map | NDE Report | 100 % Weld | W | R | R | R | R |  |
| 2-4-5 | PWHT  | Heat Treatment | ASME Sec. VIII, API 618, NACE | App. Dwg. | --- | As Required | W | W | R | R | R | if applicable |
| 2-4-6 | Visual and Dimensional Inspection | Conformance to Design/ Spec | App. Dwg. | App. Dwg. | QC Report | --- | W | R | R | R | R |  |
| 2-4-7 | Hydrostatic Test | Mechanical Strength | API Code & App. Procedure + ASME Sec. VIII | App. Procedure | QC Report | --- | W | H | R | R | R |  |
| 2-4-8 | Painting inspection | Conformance to Design/ Spec | Project specification | App. Procedure | QC Report | --- | W | R | R | R | R |  |
| **2-5- Instruments** |
| 2-5-1 | Material Inspection | Chemical Comp. / Mechanical Prop. | ASME or ASTM Code | App. Dwg. | Material Certificate | --- | R | R | R | R | R |  |
| 2-5-2 | Calibration Check | Adequate Performance | Project specification | Project specification | Calibration Certificate, Inspection report | --- | W | R | R | R | R |  |
| 2-5-3 | Tag & Model No & specification Check | Conformance to Design/ Spec | App. Data Sheet & Dwg. | App. Data Sheet | QC Report, Inspection report | --- | W | R | R | R | R |  |
| **2-6- Cables and Wires** |
| 2-6-1 | Visual Inspection | Conformance to Design/ Spec | Project Spec. | App. Data sheet | QC Report | --- | W | R | R | R | R |  |
| 2-6-2 | Test report, Type test Certificate, Manufacturer Declaration review | Adequate Performance | IEC60502 | App. Data sheet | Type Certificate/ test report | --- | R | R | R | R | R |  |
| **2-7- Junction Box** |
| 2-7-1 | Visual Inspection, accessories check | Conformance to Design/ Spec | App. Dwg. + App. Data Sheet | App. Dwg. + App. Data Sheet | QC Report | --- | W | R | R | R | R |  |
| 2-7-2 | Tag & Model No. Check | Conformance to Design/ Spec | App. Dwg. + App. Data Sheet | App. Dwg. + App. Data Sheet | QC Report | --- | W | R | R | R | R |  |
| 2-7-3 | Review IP, ATEX certificate | Conformance to Design/ Spec | IEC60529, IEC60079 | App. Dwg. + App. Data Sheet | QC Report | --- | R | R | R | R | R |  |
| **2-8- Electromotor** |
| 2-8-1 | Visual Inspection | Conformance to Design/ Spec | Manufacture Data Sheet | Manufacture Data Sheet and Drawing | QC Report | --- | W | R | R | R | R |  |
| 2-8-2 | Dimensional Check | Conformance to Design/ Spec | Manufacture Drawing | Manufacture Drawing | QC Report | --- | W | R | R | R | R |  |
| 2-8-3 | Type test certificate, IP, ATEX certificate, Routine tests report Review | Adequate Performance | IEC60529, IEC60079, IEC60034 | Project Specification and Manufacture standard | Certificate / Manufacturer test report | --- | R | R | R | R | R |  |
| 2-8-4 | Packing inspection and painting | Conformance to Design/ Spec | Project Specification | Project Specification and Manufacture standard | QC Report | --- | W | R | R | R | R |  |
| **2-9- Local Switch Panel** |
| 2-9-1 | Visual Inspection | Conformance to Design/ Spec | Manufacture Data Sheet | Manufacture Data Sheet and Drawing | QC Report, Inspection report | --- | W | W | R | R | R |  |
| 2-9-2 | Dimensional Check | Conformance to Design/ Spec | Manufacture Drawing | Manufacture Drawing | QC Report, Inspection report | --- | W | R | R | R | R |  |
| **2-10- Control Panel (Indoor-Safe Area)** |
| 2-10-1 | Visual Inspection | Conformance to Design/ Spec | Manufacture Data Sheet | Manufacture Data Sheet and Drawing | QC Report, Inspection report | --- | W | W | R | R | R |  |
| 2-10-2 | Function test (Power and start-up check, I/O check) | Adequate Performance | Project Spec | Project Spec. | QC Report, Inspection report | --- | H | H | R | R | R |  |
| 2-10-3 | Main equipment certificate, IP, ATEX, SIL certificate Review | Conformance to Design/ Spec | IEC60529, IEC60079, IEC60034 | Project Specification and Manufacture standard | QC Report, Inspection report | --- | R | R | R | R | R |  |
| **2-11- Valves** |
| 2-11-1 | Material Inspection | Chemical Comp. / Mechanical Prop. | ASTM Code | App. Dwg. + App. Data Sheet | Material Certificate | --- | R | R | R | R | R |  |
| 2-11-2 | Visual and Dimensional Inspection | Conformance to Design/ Spec | App. Dwg. | App. Dwg. | QC Report | --- | W | R | R | R | R |  |
| **2-12- Strainers** |
| 2-12-1 | Material Inspection | Chemical Comp. / Mechanical Prop. | ASTM Code | App. Dwg. + App. Data Sheet | Material Certificate | --- | R | R | R | R | R |  |
| 2-12-2 | Hydro Test | Mechanical Strength | Project Spec. | Project Spec. | Test Report | --- | W | R | R | R | R |  |
| 2-12-3 | Visual and Dimensional Inspection | Conformance to Design/ Spec | App. Dwg. | App. Dwg. | QC Report | --- | W | R | R | R | R |  |
| **2-13- Piping Items** |
| 2-13-1 | Material Inspection | Chemical Comp. / Mechanical Prop. | ASTM Code | App. Procedure | Material Certificate | --- | W | W | R | R | R |  |
| 2-13-2 | NDTs | Mechanical Integrity | Approved Procedure | ASTM Code & Approved Procedure | NDE Report | --- | W | R | R | R | R |  |
| 2-13-3 | PWHT  | Heat Treatment | ASME Sec. VIII, API 618, NACE | App. Dwg. | --- | As Required | W | W | R | R | R | if applicable |
| 2-13-4 | Hydrostatic Test | Mechanical Strength | Approved Procedure | Approved Procedure | Test Report | --- | W | R | R | R | R |  |
| 2-13-5 | Visual Inspection | Conformance to Design/ Spec | App. Dwg. | App. Dwg. | QC Report | --- | W | W | R | R | R |  |
| **2-14- Compressor assembly** |
| 2-14-1 |  Final Assembly Inspection | System Integrity | App. DWG | App. DWG | Inspection Report | --- | W | W | W | W | W |  |
| 2-14-2 | Final Visual and Dimensional Inspection | Conformance to Design/ Spec | App. DWG | App. DWG | Inspection Report | --- | W | W | W | W | W |  |
| 2-14-3 | Painting Inspection | Conformance to Design/ Spec | Project specification | App. Procedure | Test Report | --- | W | R | R | R | R |  |
| 2-14-4 | Packing and Marking Inspection | Conformance to Design/ Spec | Project and Manufacturer’s specification | Packing and Marking Procedure | Inspection Report | --- | H | H | R | R | R |  |
| 2-14-5 | FDB | --- | --- | Final Data Book | --- | --- | R | R | R | R | R |  |
| 2-14-6 | IC & IRN | --- | Signed & Stamped Packing list  | --- | IRN | --- | - | H | - | - | - |  |
| 2-14-7 | SAT/Performance Test | --- | Project specification | App. Procedure | Test Report | --- | - | H | H | H | H | Test supervision is by HY. |