

 NISOC	نگهداشت و افزایش تولید میدان نفتی بینک سطح الارض احداث ردیف تراکم گاز در ایستگاه جمع آوری بینک								
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	BK	GCS	PEDCO	120	ME	SP	0006		D05

طرح نگهداشت و افزایش تولید ۲۷ مخزن

SPECIFICATION FOR AIR COMPRESSOR PACKAGE

نگهداشت و افزایش تولید میدان نفتی بینک

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AFD: Approved For Design

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AB-R: As-Built for Company Review

IFC: Issued For Comment

IFI: Issued For Information

IFA: Issued For Approval

AFP: Approved For Purchase

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1.0 INTRODUCTION

Binak oilfield in Bushehr province is a part of the southern oilfields of Iran, is located 20 km northwest of Genaveh city.

With the aim of increasing production of oil from Binak oilfield, an EPC/EPD Project has been defined by NIOC/NISOC and awarded to Petro Iran Development Company (PEDCO). Also PEDCO (as General Contractor) has assigned the EPC-packages of the Project to "Hirgan Energy - Design and Inspection" JV.

As a part of the Project, a New Gas Compressor Station (adjacent to existing Binak GCS) shall be constructed to gather of 15 MMSCFD (approx.) associated gases and compress & transfer them to Siahmakan GIS.

GENERAL DEFINITION

The following terms shall be used in this document.

CLIENT:	National Iranian South Oilfields Company (NISOC)
PROJECT:	Binak Oilfield Development – Surface Facilities; New Gas Compressor Station
GENERAL 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.

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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.

2.0 SCOPE

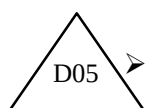
This specification covers the general requirements to be fulfilled for design, fabrication and supply of Air Compressor. The intent of this general specification is to supplement, amend or limit ISO-10440-2 Packaged Air Compressor.

3.0 NORMATIVE REFERENCES

The latest edition of following codes & standards are applicable in this project (unless otherwise mentioned):

3.1 LOCAL CODES AND STANDARDS

- IPS-C-EL-115(1) Construction Standard for Electrical Installation.
- IPS-I-EL-217(2) Inspection Standard for Pre commissioning Electrical Tests.
- IPS-M-EL-143(3) Material and equipment standard for low voltage switchgear and control gear.
- IPS-M-EL-144(4) Material and Equipment Standard for Medium and High Voltage AC Switchgear and Control gear.
- IPS-M-EL-138(1) Material and Equipment Standard for Synchronous Generators.
- IPS-M-PM-290(2) Material and Equipment Standard for Reciprocating Internal Combustion Engines.
- IPS-M-EL-131(2) Material and Equipment Standard for



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- IPS-M-EL-132(2) Low Voltage Induction Motors.
Material and Equipment Standard for Medium and High Voltage Induction Motors.
- IPS-G-SF-900 Noise Control and Vibration.
- IPS-G-GN-210 General Standard for Packing & Package.
- IPS-C-PM-216 (1) Assembling and Installation.
- IPS-E-PR-330 Process Design of Compressed Air System.
- IPS-M-PM-220 Rotary type Positive Displacement Compressor.
- IPS-M-PM-320 Lubrication, Shaft sealing.
- IPS-E-EL-100(1) Engineering Standard for Electrical System Design.
- IPS-M-EL-161(2) Material and Equipment Standard for Electrical Items.
- IPS-G-IN-200(Excluding 6.2 clause) General Instrumentation for Air System.
- NISOCS-M-EL-131 Material and Equipment Standard for Low Voltage Induction Motors.

3.2 INTERNATIONAL CODES AND STANDARDS

ISO 10440-2	Petroleum and Natural Gas Industries-Rotary- type Positive Displacement Compressors.	1st Edition-2001
API 619	Rotary type Positive Displacement Compressor for Petroleum, Petrochemical and Natural Gas Industry.	5th Edition-2010 5th Edition-2010

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API 614	Lubrication, Shaft Sealing and Control-Oil Systems and Auxiliaries for Petroleum, Chemical and Gas Industry Services.	5 th Edition-2008
API 670	Vibration, Axial-Position and Bearing-Temperature Monitoring System.	5 th Edition-2014
API 671	Special Purpose Couplings for Petroleum and Gas Industry Service.	4 th Edition-2007

3.3 THE PROJECT DOCUMENTS

- BK-GNRAL-PEDCO-000-EL-DC-0001 Electrical System Design Criteria
- BK-GCS- PEDCO -120-PI-SP-0001 Piping Material Specification.
- BK-GNRAL-PEDCO-000-EL-SP-0017 Specification For MV Electro Motors.
- BK-GNRAL-PEDCO-000-EL-SP-0010 Specification For LV Electro Motors.
- BK-GNRAL-PEDCO-000-PR-DB-0001 Process Basis Of Design.
- BK-GNRAL-PEDCO-000-PR-DC-0001 Process Design Criteria.
- BK-GNRAL- PEDCO -000-ME-DC-0001 Mechanical Design Criteria.
- BK-GCS- PEDCO -120-IN-DB-0001 Instrument & Control System Basis of Design.
- BK-GNRAL-PEDCO-000-IN-SP-0004 Specification For Instrument and Control of Package Unit System



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- BK-GNRAL-PEDCO -000-IN-SP-0001 Specification For Instrumentation.
- BK-GNRAL-PEDCO-000-IN-SP-0002 Specification For Control System.
- BK-GNRAL-PEDCO-000-PI-SP-0003 Specification For the Design of Piping in Mechanical Packages.

3.4 ENVIRONMENTAL DATA

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

3.5 CONFLICTING REQUIREMENTS

In case of any conflict between the contents of this document or any discrepancy between this document and other project documents or reference standards, this issue must be reported to the CLIENT. The final decision in this situation will be made by CLIENT.

4.0 TECHNICAL SPECIFICATION

Units

SI metric system of measurement including "°C" and "bar" shall be used in design of the equipment except for flange ratings which shall be "psi" and pipes, pipe fitting sizes and nozzle dimensions which shall be "inches".

Acceptability Criteria

Vendor shall not offer prototype design or a design with less than 2 years of successful operation in similar service.

A reference equipment/ Client list shall be submitted together with proposal.

The Vendor may offer alternative designs for Client's consideration and approval.

Obviously the proposed equipment should have similar performances and the supplier will guarantee them.

Deviations

No deviations from project specifications, this general specification or the ISO standards are allowed, without prior written approval of the Client.

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Guidelines

Compressors shall be designed and fabricated according to ISO 10440-2. In this regard, the amendments/supplements to ISO 10440-2 given in this specification are directly related to the equivalent sections or clauses in ISO 10440-2. For clarity, the section and paragraph numbering of ISO 10440-2 has been used as far as possible. Where clauses in ISO 10440-2 are referenced within this specification, it shall mean those clauses are amended by this specification. Clauses in ISO 10440-2 that are not amended by this specification shall remain valid as written.

Sub. (Substitution) "The clause in ISO shall be deleted and replaced by the new clause in this specification".

Del. (Deletion) "The clause in ISO shall be deleted without any replacement".

Add. (Addition) "The new clause with the new number shall be added to the relevant section of ISO".

Mod. (Modification) "Part of the clause or paragraph in ISO shall be modified and/or the new description and/or statement shall be added to that clause or paragraph as given in this Specification".

5.0 AMENDMENT TO ISO 10440-2

4. BASIC DESIGN

4.1 General

4.1.13 (Sub.) Compressors shall be designed to minimize the generation of noise and shall not exceed the noise limits given in the supplementary clauses below.

4.1.13.1 (Add.) All definitions, notations, measuring equipment, measuring procedures, test reporting, calculation methods and calculation procedures shall be in accordance with IPS-G-SF-900.

4.1.13.2 (Add.) Unless otherwise specified, the following limits shall be met at any measuring location "1 m" from the equipment surface shall not exceed 85 dBA.

4.1.15 (Mod.) Unless otherwise specified, equipment shall be suitable for outdoor installation without roof or shelter protection. Ambient condition range is stated in the "Process Basis of Design".

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4.1.16 (Add.) Compressor Manufacturers shall be considered on the basis of a successful proven design with associated reference list for similar sized machines operating in equivalent service conditions.

4.3 Casing Connections

4.3.1 (Mod.) Inlet and outlet connections shall be flanged as specified.

4.3.7 (Mod.) Flanges shall be in accordance with ASME B16.5.

4.3.12 (Add.) The suction system of each compressor shall be fitted with an air filter. The size of each air filter shall be designed for six months of continuous normal operation in the local environment conditions without replacement of the filter cartridge (maximum allowable pressure loss 50 mbar).

Air inlets shall be supplied with birds screen and designed to avoid rain water ingress and shall be made of AISI 316L Stainless Steel.

The air filter shall be fitted with a differential pressure gauge readable at ground level.

4.4 (Mod.) External Forces And Moments

Allowable nozzle loads on Air Compressor Package shall be considered **in accordance with 3 times those specified in NEMA SM23.**

4.5 Rotating Elements

4.5.1 Rotors

4.5.1.2 (Mod.) Rotors and shafts shall be forged and heat-treated steel.

4.7 Dynamics

4.7.2.1 (Mod.) Major parts of the rotor assembly shall be individually statically & dynamically balanced.

4.8 Bearing & Bearing Housings

4.8.1 (Add.) Bearings shall be mounted in a separate cartridge which is removable from the casing allowing the bearing to be removed from the shaft without removing the rotor from the casing.

4.11 Materials

4.11.5 Material Inspection

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4.11.5.1 (Mod.) The following examinations are required:

Butt welded joints of pressure casings shall be 100% radiographed. Inspection procedure for other pressure casing welds shall be approved by the Client. Examination methods and acceptance criteria shall be per ASME Code Section VIII, para. UW-51;

Welded joints on rotors shall be radiographed. Acceptance standards shall be the same as for butt welded joints; Silencer welds shall be 100% radiographed; Support leg attachment welds shall be examined by magnetic particle method. Non-magnetic materials may be inspected by dye penetrant method.

4.12 Name Plates

4.12.1 (Mod.) Nameplates shall be of stainless steel material.

4.12.2 (Mod.) The text on nameplates shall be in the English language and the data shall be in SI units unless otherwise is specified. The information on nameplates shall include the year of manufacturing.

5. Accessories

5.1 Drivers

5.1.1 (Mod.) Electric motor shall comply with the "Specification for Motors" mentioned in section 3.1 .

5.3.2 Base plate

5.3.2.1 (Mod.) Motor drives may be mounted on a common base plate with compressor and gear or separately on soleplates, as specified on data sheets.

5.4 Controls and Instrumentation

5.4.1.1 (Mod.) Instrumentation shall be in accordance with "Specification for Instrument and Control of Package Unit System DOC No.: BK-GNRAL-PEDCO-000-IN-SP-0004 specified in section 3.3"



5.4.2 Control System

5.4.2.1 (Mod.) Vendor shall furnish compressor capacity control. PLC based UCPs (one for each compressor) shall be considered to be mounted in control room and one of them shall be authorized as master logic controller of complete air package. UCPs shall be connected to the PCS, ESD, for required monitoring, control functions and shutdowns as per P&ID.

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UCP panel door mounted HMI shall including alarm, trip and interlock logic annunciator lamp and buzzer(if any). If UCP is control room mounted, required LCP for local command is required for each compressor. SIL rated loops for safety and trip commands shall be considered. Lap top for engineering and maintenance and all original software and licences shall be prepared by vendor.



Standalone control panel (as minimum microprocessor based) located on dryer skid for all required signaling, local logic, monitoring and etc. which shall be connected to control room mounted UCP of air compressor. Master UCP of package shall allow each dryer to be worked as duty independent of compressor duty/standby selection.

5.4.3.1 (Mod.) local control panel (LCP) mounted on the each compressor platform and a local control panel (LCP) mounted on the each dryer shall be supplied by the vendor, completely enclosed and sealed and suitable for pressurizing to keep out dust. The panel shall include all the applicable items listed, together with alarm lights suitably screened to be easily visible in bright sunlight and other process instruments as required.

Access for easy maintenance to this panel shall be provided, and location of the panel shall be so as to facilitate easy control of the equipment. Consideration may also be given to the installation of a separate ground mounted panel to cover auxiliary equipment mounted on the console if easier operation would result.

5.4.6.2 (Mod.) Based on the vendor's experience and recommendation, non-contacting vibration and axial transducers shall be supplied, installed and calibrated in accordance with API 670.

5.4.6.4 (Mod.) Based on the vendor's experience and recommendation, vibration and axial position monitors shall be supplied and calibrated in accordance with API 670.

6.3 TESTS

6.3.4 Optional tests

6.3.4.2 (Mod.) Performance test to be done.

6.0 GUARANTEE AND WARRANTY

6.1 Performance Guarantee

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The vendor has to guarantee the rated conditions specified on data sheet with zero tolerance on capacity at the normal operating point certified by the manufacturer. The compressor vendor shall submit the design tolerance between the compressors rated capacity and the required capacity. The actual absorbed power shall not exceed the guaranteed power by more than 4% as per API 619. If the compressor set does not achieve performance guarantee, the vendor has to analyse the cause of the failure and take the necessary actions in order to reach the guarantee values at his care and cost. After make-good, an official performance test shall be performed. Vendor shall guarantee the maximum and normal expected consumption for all required utilities (electric power, both for normal and UPS sources, instrument air, fuel, etc.).

6.2 Mechanical Guarantee

The vendor against fault in design, defective or improper materials, poor workmanship and failure shall guarantee all equipment and component parts from normal usage during the guarantee period. If any defects or mal performance occur during the guarantee period, vendor shall make all necessary or desirable alteration, repairs and replacement free of charge. The guarantee period shall be eighteen (18) months from the date of delivery or twelve (12) months from the installation date of each equipment/packages at site, Which ever comes sooner. Any supervision cost during this repair shall be on vendor care and cost.