



نگهداشت و افزایش تولید میدان نفتی بینک
سطح الارض



احداث ردیف تراکم گاز در ایستگاه جمع آوری بینک

شماره پیمان:

SPECIFICATION FOR CHEMICAL INJECTION PACKAGES

شماره صفحه ۱ از ۲۷

۰۵۳ - ۰۷۳ - ۹۱۸۴

نسخه	سریال	نوع مدرک	رشته	تسهیلات	صادرکننده	بسته کاری	پروژه
D02	0008	SP	ME	120	PEDCO	GCS	BK

طرح نگهداشت و افزایش تولید ۲۷ مخزن

SPECIFICATION FOR CHEMICAL INJECTION PACKAGES

نگهداشت و افزایش تولید میدان نفتی بینک

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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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REVISION RECORD SHEET

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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

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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.

2.0 SCOPE

This specification covers the minimum necessary requirements of the mechanical design, fabrication, testing inspection and delivery of the Chemical Injection Packages that are used in this Project. It shall be used in conjunction with data/requisition sheets for present document subject.

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-E-PR-905 Engineering Standard for Process Design of Dryers.
- IPS-E-PR-492 Engineering Standard for Process Requirements of Caustic and Chemical Systems.
- IPS-G-GN-210 General Standard for Packing and Packages.
- IPS-M-PM-150 Materials & Equipment Standard for Positive Displacement Pumps-Controlled Volume.
- IPS-G-ME-100 General Standard for Atmospheric Above Ground Welded Steel Tanks for Oil Storage.

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- IPS-E-EL-100 Engineering Standard for Electrical System Design.
- IPS-M-EL-161(2) Material and Equipment Standard for Electrical Items.
- IPS-E-SF-400 Engineering Standard for Industrial Stairs, Ladders, Platforms and Scaffolds.
- IPS-G-SF-900 General Standard for Noise Control and Vibration.
- IPS-E-TP-100 Engineering Standards for Paints.
- IPS-C-TP-742 Construction Standard For Corrosion Consideration During Fabrication and Installation.

3.2 INTERNATIONAL CODES AND STANDARDS

- API 675 Positive Displacement Pumps – Controlled Volume.
- API 650 Welded Tanks for Oil Storage.
- ASME BPVC, SEC. II Boiler and Pressure Vessel Code – Materials Specifications.
- ASME BPVC, SEC. V Boiler and Pressure Vessel Code – Non-destructive Examination.
- ASME BPVC, SEC. IX Boiler and Pressure Vessel Code - Welding and Brazing Qualification.
- AISC – ASD Manual of Steel Construction – Allowable Stress Design.
- ANSI / ISA S5.1 Instrumentation Symbols and Identification.
- API RP 520 Sizing, Selection and Installation of Pressure Relieving Devices in Refineries.
- API RP 521 Guide for Pressure Relieving and

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Depressurising Systems.

- ASME B 16.11 Forged Fittings, Socket Welding and Threaded Ends .
- ASME B 16.5 Steel Pipe Flanges and Flanged Fittings
- ASME B 16.20 Metallic Gaskets for Pipe Flanges – Ring Joint, Spiral Wound and Jacketed.
- ASME B 16.21 Non-Metallic Flat Gaskets for Pipe Flanges.
- ASME B 31.3 Process Piping.
- ASTM American Society of Testing & Materials
- ASCE 7-02 Minimum Design Loads for Buildings and Other Structures.
- BS EN 10204:2004 Metallic Products - Type of Inspection Documents.
- BS EN ISO 9000 Quality Management Systems - Fundamentals and Vocabulary.
- BS EN ISO 9001:2008 Quality Management Systems – Requirements.
- EEMUA 140 Noise Procedure Specification Guidelines.
- IEC 60079 Electrical Apparatus for Explosive Gas Atmospheres.
- IEC 60085 Evaluation and Classification of Electrical Insulation.
- IEC 60227 Polyvinyl Chloride Insulated Cables of Rated Voltages up to and including 450/750V.
- IEC 60331 Tests for Electric Cables Circuit Integrity under fire Conditions – Circuit Integrity.
- IEC 60332 Tests on Electrical Cables under Fire Conditions.

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- IEC 60529 Degrees of Protection Provided by Enclosures (IP Code).
- IEC 60584 Thermocouples.
- NEMA National Electrical Manufacturers Association.
- ISO 1461 Hot-dip Galvanized Coating on Fabricated Iron and Steel Articles Specification and Test Methods.
- ISO International Organization of Standardization.

3.3 THE PROJECT DOCUMENTS

- BK-GNRAL-PEDCO-000-PR-DB-0001 Process Basis Of Design
- BK-GNRAL-PEDCO-000-PR-DC-0001 Process Design Criteria
- BK-GCS-PEDCO-120-PR-LI-0004 Chemical Consumption List
- BK-GNRAL-PEDCO-000-ME-SP-0002 Specification For Atmospheric Above Ground Welded Steel Tanks
- BK-GNRAL-PEDCO-000-ME-DC-0001 Mechanical Design Criteria
- BK-GNRAL-PEDCO-000-PI-DC-0001 Piping Design Criteria
- BK-GCS-PEDCO-120-PI-SP-0001 Piping Material Specification
- BK-GNRAL-PEDCO-000-PI-SP-0005 Specification For Fittings, Flanges , Gaskets and Bolts
- BK-GNRAL-PEDCO-000-PI-SP-0006 Specification For Painting
- BK-GCS-PEDCO-120-PI-RT-0001 Corrosion Study & Material

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<ul style="list-style-type: none"> ➤ BK-GNRAL-PEDCO-000-PI-SP-0011 ➤ BK-GNRAL-PEDCO-000-IN-SP-0001 ➤ BK-GNRAL-PEDCO-000-IN-SP-0004 ➤ BK-GNRAL-PEDCO-000-EL-SP-0011 ➤ BK-GNRAL-PEDCO-000-EL-SP-0010 ➤ BK-GNRAL-PEDCO-000-SA-SP-0002 ➤ BK-GNRAL-PEDCO-000-EL-DC-0001 ➤ BK-GNRAL-PEDCO-000-PI-SP-0003 ➤ Piping and Instrumentation Diagrams 	<p>Selection Report</p> <p>Specification For Welding of Plant Piping System</p> <p>Specification For Instrumentation</p> <p>Specification For Instrument and Control of Package Unit System (PU)</p> <p>Specification For Electrical Requirements of Packaged Units</p> <p>Specification For LV Electro Motors</p> <p>Specification For Hazardous Area Classification</p> <p>Electrical System Design Criteria.</p> <p>Specification For the Design of Piping in Mechanical Packages.</p>
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3.4 ENVIRONMENTAL DATA

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

4.0 BASIS DESIGN

4.1 GENERAL

The Chemical Storage Tank(s) shall be designed according to API 650 and IPS-G-ME-100.

Also the piping shall be designed according to ASME B 31.3 and IPS-E-PR-440 .

The Chemical Injection Package shall be delivered as a complete and operable skid mounted package with all piping, control instrumentation and electrical connections ready for installation

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and hook-up .

All equipment, piping, and accessories shall be either directly attached to or supported by the skid base to minimize vibration and prevent breakage. The VENDOR shall minimize the size of the package based on optimization of equipment, piping sizing and layout .

The package shall not be limited to equipment referenced in this specification, but shall include all items to make the unit fully operable. The system shall be fully piped and wired within the confines of the skid. The Vendor furnished piping shall terminate with flanged connections at the edge of the skid base. All piping and wiring shall comply with the standards referenced in this Specification .

The design of the Chemical Injection Package shall be in accordance with the requirements of this specification. The design of equipment parts which are not covered by this specification shall be detailed and agreed with the Client.

Chemical storage tank(s) shall be based on Vendor's standard and vertical type.

Chemical feed systems shall be designed to ensure high reliability and flexibility enough to cover contingencies that may arise. The required volume of chemical as well as its physical and characteristics should also be considered in the feed system design. The design life of equipment shall be 20 years minimum.

This specification defines the minimum requirements for design and supply of the Chemical Injection Package for the project. The package shall be capable of meeting the required process duties as specified in the equipment datasheet. According to P&ID, The Package shall include, but not be limited to, the following components:

- Chemical storage tank(s)
- Pump suction strainer with bypass
- Controlled volume dosing pumps
- Calibration pot
- Mixer
- Interconnecting piping
- Pulsation Damper
- Instrumentation, control and electrical including junction boxes
- Structural skid base, complete with drip pans
- FI (Flow Indicator) in the injection point and discharge

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- A tray under the package to gathering the package equipment drain
- Spare part for 2 years of operation and commissioning
- Test and certificate
- Special tools for operating and maintenance
- Pump external Safety valve
- Loading Pumps along with temporary connections

The package, including all sub-assemblies, shall be fully assembled, hooked up and tested in the VENDOR's works prior to shipment of the skid mounted .

Specific process and mechanical design requirements applicable to the Chemical Injection Package are stated on the data sheets and enquiry / purchase requisition .

Where either the Vendor's standard or preferred design option does not meet the specified operating conditions, which is detailed in the package data sheet, the Vendor shall submit details of the technical changes and commercial impact of complying with the stated conditions for the Client's review and approval.

All package components which require regular monitoring or maintenance shall be easily accessible by operations personnel. The package shall be designed such that all maintenance can be carried out with the minimum of special facilities. Ladder shall be furnished if required.

4.2 OPERATING CONDITIONS

The VENDOR is responsible for ensuring that all equipment and components provided are suitable for the operating conditions stated in the data sheets, and for the listed fluids and available utility supplies .

Where either the VENDOR's standard or preferred design option does not meet the specified operating conditions, the VENDOR shall submit details of the technical changes and commercial impact of complying with the stated conditions for the Client review and approval.

The process operating and design conditions for the Chemical Injection Package are detailed in the package data sheets.

4.3 MECHANICAL REQUIREMENT

4.3.1 CHEMICAL STORAGE TANKS

The storage tank(s) shall be Vendor's standard and vertical type. Refer to the equipment

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data sheets for specific equipment details.

Wall/roof Plates of tank(s) shall have a minimum thickness of 5 mm. Plates material shall be stainless steel type 316L.

The chemical storage tank(s) shall be fitted with the following equipment:

- Dipped fill connection with manual isolation valve, flexible hose and hose coupling. (only for methanol injection package) Hose to be stored on dedicated bracket on base frame. Flexible hose and hose coupling shall be stainless steel.
- Inert gas purge connection fitted with blank flange
- Atmospheric vent manifolded and routed to the skid edge
- Calibrated level gauge with isolation valves
- Level transmitter
- Bottom outlet connection
- Overflow connection
- Manway/removable roof plate.
- Mixer & Mixer support.
- Ladder

Chemical storage tank(s) shall be stored the corrosion inhibitor materials for 14 days.(at least)

4.3.2 CONTROLLED VOLUME PUMPS

The pumps injection rates shall be determined per the calculation of required chemical volume. The controlled volume pump shall meet the requirements of API 675 as amended and supplemented by IPS-M-PM-150. Refer to the corresponding pump data sheet for required duties and specific equipment details.

The controlled volume pumps shall be fitted with individual manual stroke adjustment of 0-100% for use while stationary or running. The pumps shall not be operated at less than 10% volume capacity. The pumps shall be constructed of 316L stainless steel with components suitable for the specified chemical duty. The material grades shall be as per API 675 unless specified in data sheet .

Couplings and coupling to shaft junctures shall be rated for at least the maximum driver horsepower plus minimum service factor of 1.5.

The controlled volume pumps suction piping shall be located below the bottom of the

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storage tank(s). The pumps suction piping shall be as short as possible .

A pulsation dampener shall be installed in the pumps discharge piping .

The pumps shall be equipped with adjustment locking device and diaphragm rupture detection device.

Local start/stop provisions shall be provided. Pump shall also trip on low level of the chemical Storage Tank(s).

If the diaphragm type of controlled volume pumps is used, diaphragm rupture sensor shall be furnished and its alarm shall be monitored locally and in the control room.

AGMA minimum 1.5 service factor shall be based on maximum relief valve setting.

4.3.3 MIXERS

A mixer shall be provided for each Storage Tank(s) (if specified in the relevant P&ID)

Mixers shall be stable while agitating contents of Tank(s) from 1/3 to full .

All wetted parts shall be stainless steel.

4.4 MATERIALS OF CONSTRUCTION

The package material shall be in compliance with the requirements of the project “Corrosion Study & Material Selection Report” and project “Piping Material Specification” and relevant data sheets.

The minimum size of the package pipes shall be 3/4” and material used of them shall be S.S 316L. Material of the Storage Tank(s) and its leg supports shall be S.S 316L.

Where materials have been specified in the datasheets, the VENDOR shall confirm their acceptability for the service. The VENDOR shall provide details of proposed materials of construction with the bid.

Full traceability of all material components (to material certificates) is required.

The Supplier shall review the material selection against exposure to fluids, short term chemical treatments, and erosion and corrosion resistance requirements. Alternatives may be proposed for the Client’s review.

The suitability of all materials in contact with injected chemicals over field life and at service temperatures shall be fully confirmed by the Supplier.

Vendor shall address the name and brand of each component of package and receive the approval of Client in advance.

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4.5 PIPING AND VALVES

All package piping and valves shall comply with the requirements of IPS-E-PI-240, ASME B-31.3 and the project "Piping Material Specification".

All interconnecting piping, valves, and fittings shall be in accordance with IPS-E-PI-240. The piping material for the chemical injection unit shall be in compliance with the requirements of the project "Corrosion Study & Material Selection Report" and project "Piping Material Specification".

Ancillary pipe work vents and drains piping and valves shall be provided by the VENDOR. All packages shall be equipped with a drip tray in the bottom of the skid and shall drain to a catch basin.

All VENDOR terminal points shall terminate at the package skid edge (main skid and any off skid equipment), in flanges conforming to ASME B16.5. These tie-ins will be clearly identified in the VENDOR General Arrangement drawings.

Tie-ins shall be designed so that Movements and Rotation tend to zero and Allowable imposed loads and moments from Piping conform to the those Values that specified in "Specification for Pressure Vessels".

All piping joints shall be butt welded or socket welded and flanged. Instrument piping with compression fitting may be used to maximum 1 inch outside diameter. All nozzle connections shall be suitably supported and reinforced for the nozzle loads specified in the project documents.

Using tubes is not allowed and only suitable pipes shall be used.

Neoprene rubber or other insulating material shall be installed between stainless steel pipe and all carbon steel and galvanized appurtenances such as pipe supports. Supports shall not be installed under circumferentially welded joints.

Bolts shall extend completely through the nuts for a minimum of one thread and a maximum of 0.500 inches. An equal number of threads shall extend beyond the nut at each end of the studs.

According to P&ID, pump suction piping shall be supplied with the following in line items:

- Single manual isolation valve located on storage tank(s) outlet connection.
- Storage tank(s) drain connection with manual valve fitted with downstream stainless steel plug.
- Tubing suction header with lines to each pump inlet.
- Manual valve on each pump suction.

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- Individual suction strainer downstream of pump suction valve.
- Calibration pot. The gage glass shall be furnished with a gage board calibrated in cm.

According to P&ID, pump discharge piping shall be supplied with the following in line items:

- Pulsation dampeners shall be provided to limit pulsation within $\pm 3\%$. The pulsation dampener shall be designed as per ASME Section VIII Div. I and full radiography shall be done. The details of pulsation dampener shall be given by Supplier.
- A safety relief valve shall be provided in each pump discharge line to prevent over pressurization of the discharge lines. The safety relief valve shall relieve back to the chemical injection storage tank(s). Local pressure gauges shall be provided at locations where the pressure is required to be monitored.
- Pressure indicator
- Local vent valve
- Check valve
- Manual isolation valve
- Header piping to the skid edge

Flange Insulation Kit for chemical storage tank(s) shall be manufactured and inspected in accordance with IPS-M-TP-750.

4.6 ELECTRICAL REQUIREMENTS

Electrical requirements for the chemical injection packages shall be in accordance with the "Specification for Electrical Requirements of Packaged Units"; Doc. No. BK-GNRAL-PEDCO-000-EL-SP-0011.

Electric motors shall be of the 400 v, 3-phase and 50 Hz cage induction, totally enclosed, fan-cooled type and rated to start and accelerate the load with 80% voltage at their terminals. They shall be designed, manufactured and tested in accordance with the "Specification for Electrical Requirements of Packaged Units"; Doc. No. BK-GNRAL-PEDCO-000-EL-SP-0011.

The package base plate(s) shall be provided with an earthing and bonding system. The skids shall be provided with 2 earthing bosses located at diagonally opposite corners as per the "Specification for Electrical Requirements of Packaged Units"; Doc. No. BK-GNRAL-PEDCO-000-EL-SP-0011.

Electrical Motor gas group and electrical panel enclosure shall be in accordance with

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IPS-E-EL-110 standard.

In the package electrical panel, electro-pump starters shall be considered.

All junction boxes shall be provided with 20% spare terminals so that all spare cores of incoming cable can be terminated.

In order to simultaneous running the mixer with the pumps, timer in control panel shall be considered.

4.7 INSTRUMENTATION REQUIREMENTS

Design, supply and installation of instrumentations, shall follow the requirements of "Specification for Instrumentation"; Doc. No. BK-GNRAL-PEDCO-000-IN-SP-0001, "Specification for Instrument & control of packaged unit System (PU)"; Doc. No. BK-GNRAL-PEDCO-000-IN-SP-0004 and "Specification for Hazardous Area Classification"; Doc. No. BK-GNRAL-PEDCO-000-SA-SP-0002.

Regarding the type of protection of the control panel (Hazardous Area or Non-Hazardous Area), it is necessary to install the appropriate local control panel according to the installation location (with the approval of the Client).

All instruments shall be tagged with identifying tag numbers which are assigned by Client at time of drawing approval.

An electrical local control panel(s), Suitable for Non-hazard area, shall be provided with the facility to start and stop the package locally. For more detail refer to "Specification for Electrical Requirements of Packaged Units"; Doc. No. BK-GNRAL-PEDCO-000-EL-SP-0011.

VENDOR shall supply all field instruments cable to skid edge JB's. Some signals may be connected to PCS (Process Control System) and ESD (Emergency Shutdown) as per related P&ID.

The VENDOR shall provide wiring/connection details and narratives of any specific regulatory control or safeguarding requirements. This information shall be used by the local control panel (LCP) of the package for pump/motor control .

Low liquid level (LLL) of the drums should be measured by suitable instrument which shall be connected to LCP and may be transmitted to PCS/ESD system if required.

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4.8 STRUCTURAL REQUIREMENTS

Structural design shall be in accordance with the Iranian Petroleum standards .

Key interface information such as static and dynamic loads, bolt locations, support locations and skid footprint sizes, etc. shall be advised by the VENDOR .

The VENDOR shall identify in the bid any loose ancillary items, which are not mounted on the main skids .

All welds on supports and structures shall be continuous and seal weld .

All equipment, piping, and accessories shall be either directly attached to or supported by the skid base to minimize vibration and prevent breakage.

Shelter For chemical injection packages shall be considered. Also canopy platform with suitable height, water shower and other provision are required.

4.9 NOISE CONTROL

The package noise levels shall not exceed the limits specified on IPS-G-SF-900. The noise level shall be reduced where there are multiple components (e.g. motors) so that the package does not exceed the maximum Sound Pressure Level. VENDOR shall provide all necessary acoustic treatment required to meet the specified noise limit .

Also the related pump noise levels shall not exceed the limits specified on the 'Material & Equipment Standard for Positive Displacement Pumps-Controlled Volume; doc. No .IPS-M-PM-150.

The requirements of EEMUA 140 shall apply with regard to noise procedures and requirements .

The VENDOR shall provide expected, calculated and guaranteed sound pressure level and sound power level data (both overall and octave band) for the complete package .

The equipment lifting arrangements shall be designed for lifting each complete fully assembled shipping module, using a single point lift operation, complete with all shipping and packing materials in place. Load spreader bars are to be provided if required for single point lifting .

Lifting equipment and lugs/trunnions shall be designed using a minimum load factor of 4 and shall be suitable for use with standard shackles of the correct size for the imposed lifting loads.

All lifting equipment and lugs/trunnions shall be individually identified, proof load tested and certified.

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4.10 NAME PLATE

Each complete unit shall be provided with a type 316 stainless steel nameplate securely attached to the unit, and located so that it is clearly visible after installation. Nameplates shall be riveted to a bracket welded on to the equipment .

The following information shall, as a minimum, be engraved on the nameplate :

- Project
- Client
- Manufacturer's Name
- Manufacturer's Serial No .
- Equipment Item No .
- Purchase Order No .
- Year Of Manufacture
- Design Code Or Standard as Appropriate
- Discharge Pressure
- Design Temperature
- Injection Rate
- Material
- Storage tank(s) Capacity
- Rated Power
- Electrical Classification and Certification Body
- Weight, Empty

Letters and figures shall be 5 mm high and clearly engraved (etching is not acceptable).

5.0 INSPECTION AND TESTING REQUIREMENTS

5.1 GENERAL

Supervision and inspection during manufacturing will be carried out by Client & THIRD PARTY INSPECTOR (TPI).

The Vendor shall provide free access to his works, and to that of sub-suppliers, for the Client and/or authorized representative(s) of the Client. Client's representative shall have the right to inspect the equipment during fabrication, assembly and testing. Inspection may include drawings, materials, manufacturing and assembly. All necessary certification documents relating

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to materials, shop test data, etc., shall be made available to verify that the requirements of the purchase order are being met.

Inspection and Test Plans (ITP) shall be prepared by the VENDOR and shall be sent to the Client for his review and approval .

Inspection and testing shall be carried out in accordance with the approved VENDOR Quality Plan, ITP and Test Procedures shall comply with the requirements of this specification, the data sheets and other referenced documentation forming part of the Purchase Order .

The approval of any work by the Client, or authorized representative, and the release of equipment for shipment shall in no way relieve the VENDOR of any responsibility for carrying out the provisions of this specification.

The VENDOR shall furnish a representative ITP detailing the scope of inspection and testing of the VENDOR and Client or its nominated representative (i.e. third party inspection agency).

The Client shall witness the following tests:

- Hydrostatic test including skid piping
- Low pressure air leak test on complete piping system
- Mechanical run test
- Performance test
- Functional test of all electrical control and instrument devices, alarm and trip functions and unit control panels, as an assembled system, at the Supplier's works
- Complete package function/performance test
- Disassembly inspection at the inspector's discretion
- Equipment noise measurement.

Following final testing, all equipment shall be thoroughly cleaned, drained and dried by air blasting and preservation procedures applied before packing. The Supplier shall provide detailed procedures covering flushing, cleaning, drying and preservation, including specific requirements for passivation and chemical cleaning of stainless steel materials, etc.

Required provision for maintenance of the equipment from fabrication and Hydrostatic Test to commissioning stage shall be considered by Vendor.

Inspection and testing shall be carried out for Chemical Storage Tank(s).

5.2 TESTING REQUIREMENTS

For all of required tests, the VENDOR is to provide related test procedures for the Client

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D02	0008	SP	ME	120	PEDCO	GCS	BK											

approval.

5.2.1 PIPING HYDROSTATIC TESTS

All piping system shall be hydro tested in accordance with test procedure (approved by Client). Hydrostatic test pressure for piping system shall be 1.5 times the pump discharge design pressure. Hydrostatic test shall be performed on all the package piping after installation on to the skid to check all screwed joints and compression fittings.

The piping shall be hydro tested in accordance with ASME B 31.3 code requirements .

Prior to the hydro test, all pipe work shall be thoroughly cleaned and free from dirt, debris, loose scale and slag, pieces of metal, weld spatter, oil and grease, etc.

The water used shall be clean potable water. For austenitic stainless steel components the chloride limits in the test water shall not exceed 30 ppm.

After Hydrostatic Test, drying and maintenance procedures of the equipment till commissioning stage shall be complied.

Plant Piping Systems Pressure Testing shall be carried out according to IPS-C-PI-350.

5.2.2 INSTRUMENTATION & CONTROL AND ELECTRICAL ITEMS TESTS

All instrumentation and control equipment shall be fully function tested at the Package VENDOR's works .

All instrument functions shall be verified by using dry air as a substitute for the process gas to prove the integrity of the control equipment/ instrumentation .

The VENDOR is to provide details of his standard functional tests for the Chemical Injection Package for Client approval .

The electrical equipment on the package units shall be subjected to inspection during manufacture and testing by the VENDOR. The VENDOR shall provide access for such inspection and testing whenever required. Testing programs shall be submitted to the VENDOR prior to any test.

Unless otherwise specified in the relevant documents, testing of the electrical equipment /installation on package units shall consist of routine testing, functional testing and continuity and insulation resistance testing of cables.

For electrical equipment having separate equipment specification, the testing shall be performed as required in these specifications.

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Routine testing shall be executed in accordance with the relevant IPS & IEC standards.

Functional testing shall as a minimum include the following:

- Checking of data and compliance with specifications and data sheets.
- Visual check of all equipment items, check for tightness of all joints, glands and terminations.
- Test of protection relays (where applicable)
- Test of all alarms and shut-downs.
- Test of all instruments.
- Test of all controls.
- Motor windings and transformer windings megger for ground and moisture +accumulation. Where evidence of moisture accumulation is found, the equipment must be dried out and re-tested before putting into operation.
- Check motors for proper rotation, lubrication, and alignment.
- On circuit breakers with adjustable trips, check both thermal and magnetic settings.
- Check induction type relays for proper tap and time settings.
- Earth tests (both continuity and impedance) in accordance with the IEE recommendations for Electronic Equipment for onshore installations or BS 7671.
- For functional test, package shall run for at least 15 minutes, and during the test the complete control system, mechanical system (pumps...), and Electrical Device Performance shall be checked.

All tests shall be recorded and included in the overall test report.

5.2.3 DIMENSIONAL INSPECTION

Dimensional inspection shall be carried out by the VENDOR's inspection engineer and may be witnessed by the Client. It shall cover all main dimensions, nozzle locations, flange ratings, etc. (per the approved drawings by Client).

5.2.4 NON-DESTRUCTIVE EXAMINATION

The NDE schedule and all NDE procedures shall be subject to approval by the Client .

5.2.5 PUMPS PERFORMANCE TEST

The pumps performance test shall demonstrate the compliance of the Chemical Injection

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pumps, with the requirements of this specification, the purchase requisition and its attachments .

The test shall demonstrate the pumps operability at design conditions and that the pumps are acceptable of delivering the Chemical at the design flow rate and pressure.

5.2.6 FAT & SAT TEST

FAT test for Chemical packages shall be done under Client supervision.

SAT test at commissioning stage for Chemical packages shall be done under Client's supervision.

SAT test shall be done at the time of delivery to site if all of test conditions shall be available.

5.3 WELDING INSPECTION

Welder and welding operators shall be certified according to a recognized certification scheme. All welding shall be performed in accordance with qualified welding procedures. All NDE operators shall be certified according to a recognized certification scheme. Welding Procedures, Procedure Qualifications and NDE Procedures shall be available for review prior to manufacture . Welding inspection shall be carried out after Post Weld heat treatment if any. Either radiographic or ultrasonic methods shall be used for sub-surface inspection. Either magnetic particle or dye penetrant methods shall be used for surface inspection.

Welding inspection for "Plant Piping Systems" shall be carried out according to IPS-C-PI-290 clause 9.

Welding inspection for "Chemical Storage Tank(s)" shall be carried out according to IPS-G-ME-100 clause 7.3.

5.4 REPORTS AND ACCEPTANCE CERTIFICATES

5.4.1 GENERAL

The VENDOR shall prepare a report on the tests carried out and their results, for inclusion in the Manufacturing Record Book. Other relevant certificates, as requested by Client, shall also be included, together with the equipment release note .

5.4.2 MATERIAL CERTIFICATION

The basic requirements for the provision of material certification documents are detailed

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in the VENDOR Document Requirements Schedule, which forms part of the Requisition.
As a minimum, material certification to BS EN 10204:2004 Type 3.2 shall be supplied for the components. All materials shall be traceable to its test certificate.

6.0 FABRICATION

6.1 GENERAL

- 6.1.1 Holes shall not be cut into the shell for erection purposes.
- 6.1.2 Plate misalignment shall not be corrected by grinding off plate thickness to reduce offset.
- 6.1.3 Arc strikes on the tank shall be avoided. When they occur the surface shall be conditioned to eliminate surface stress raisers and shall be examined by the magnetic particle or liquid penetrant method.
- 6.1.4 Weld bevels for stub end nozzles shall be in accordance with the details and standards specified on the tank drawings or data sheets.

6.2 WELDING

- 6.2.1 Welding shall be in accordance with the project WPS.
- 6.2.2 Fabrication involving welding shall not be sublet to others without the prior approval of the Client.

The qualification of welding procedures for vertical joints shall include impact tests in accordance with API 650 Paragraph 9.2.2.3 when design metal temperature is below 50°F (10°C) and shall include impact tests in accordance with API 650 Paragraph 9.2.2.4 for all welding procedures for all components listed in API 650, Paragraph 4.2.9.1 including attachments to these components when design metal temperature is below 20°F (-7 °C).

7.0 PAINTING, COATING, PRESERVATION AND PACKING

7.1 GENERAL PROCEDURES

No protective coatings shall be applied until finalization and acceptance of all non-destructive testing, heat treatment and hydrostatic pressure testing of the completed

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equipment .

Throughout all coating operations, atmospheric conditions shall be monitored and logged, and all test results, humidity, dew points and steel temperatures shall be detailed on a final quality control report .

Painting & Coating shall be done based on Client's approved ITP/QCP.

7.2 PAINTING AND PROTECTIVE COATINGS

The VENDOR shall be responsible for the painting of all equipment, piping and structural steel .

Painting and protective coating shall be in accordance with the requirements of IPS-E-TP-100 and the "Specification for Painting"; Doc. No. BK-GNRAL-PEDCO-000-PI-SP-0006 .

Galvanizing shall be accordance with ISO 1461 requirements .

7.3 PRESERVATION, PACKING AND PREPARATION FOR SHIPMENT

Packing shall be in accordance with the requirement of "IPS-G-GN-210."

After final testing, all equipment shall, where appropriate, be dried and cleaned thoroughly of all grease, loose scale, and rust (both internally and externally). All cleaning agents shall be free from chlorides to prevent stainless steel contamination .

The Supplier shall advise his recommendations for long term storage, up to 12 months, for both indoor and open air storage at the job site.

All items subject to either mechanical damage or corrosion shall be properly packed and protected from damage during shipment .

All machined surfaces and threaded connections shall be protected by coating with rust preventative .

All internal parts shall be suitably supported. VENDOR shall show details on fabrication drawings .

Vapor Phase Inhibitors (VPI) shall be applied to the inside of the chemical storage tank(s) under supervision of relevant disciplines. Inhibitors shall be free from chlorides .

Pumps shall be packed for shipment in accordance with IPS-G-GN-210 and electric motors shall be in accordance with IPS-M-EL-131 .

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Flanged and other openings shall be protected with a soft gasket and a bolted steel plate cover. At least four bolts shall be used to retain the covers .

Equipment tag numbers shall be painted on shell of each storage tank using 75mm high characters in white paint on both sides. Paint used for marking on stainless steel shall be free from chlorides .

All equipment shall be shipped fully assembled where practicable providing that no damage can be incurred due to shipment forces or lifting .

When shipped loose, all loose parts shall be properly packed, protected from damage during shipment and tagged with the item number and purchase order number to facilitate installation in the field. Tags and wires shall be stainless steel .

The VENDOR shall be responsible for providing loading and anchoring procedures and points for all equipment to prevent any damage during shipment.

A copy of the complete packing list, with reference made to the location of each of the items, shall be sealed in a water proof wrapper and fixed inside all of the crates in the package.

No equipment shall be released for shipment without the Client's authorization.

Internal & External corrosion consideration during fabrication and installation till operation, for chemical storage tanks shall be in accordance with the requirement of "IPS-C-TP-742(1)"

8.0 SPARE PARTS

Commissioning and start-up spares shall be supplied by VENDOR as part of the main order .

Equipment supplier shall submit a detailed itemized priced list of recommended spare parts for 2 years operation as well as capital spares. This list shall be provided in Client Electronic format.

Commissioning & start-up and two-year normal operation spare parts shall be considered per attachment 11 of the project EPC tender dossier, as a minimum requirement.

9.0 GUARANTEE AND WARRANTY

The Vendor shall accept the complete responsibility of the package including all equipment and auxiliary systems included in the scope of supply .

The Vendor shall guarantee the process performance of the assembled equipment as specified on the Data Sheets .

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Unless otherwise agreed, all equipment shall be guaranteed to perform satisfactorily under the specific operating conditions as detailed on the data sheet and shall be fit for the intended purpose.

Noise levels shall be guaranteed not to exceed 85 dB(A) at 1 m in accordance with EEMUA 140. The Supplier shall guarantee the mechanical and structural integrity, workmanship and the materials of construction used in accordance with the warranty period and conditions stated in the commercial section of the enquiry documents.

If performances revealed during workshop and/or site performance tests, fall out of specified tolerances, the Vendor shall take corrective actions, free of charge to Client, to repairs or to modify or to replace those parts, in such a manner that performances are obtained. The time delay on that basis will be considered as Vendor's fault .

If equipment fails to meet required performances, the Client and Vendor shall mutually refer to the application of the General Conditions of Purchase .

In addition, the Vendor shall guarantee that all materials used in the equipment fabrication has been produced and tested to the required acceptance procedures and are free of any defect of aspect, shape and quality .

The Vendor shall guarantee that overall dimensions and final weight equipment will not overpass the values stated in this proposal

The Vendor shall guarantee to deliver any spare parts for a period of at least 20 (twenty) years after placement of Purchase Order .

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.

The Supplier shall agree to repair or replace any part of the chemical injection packages, under this warranty, which proves to be defective within the warranty period.

All other aspects of guarantee and warranty are covered by Material Requisition.