



پتروشیمی توسعه پارک
صنعتی گوهر افق

Toase-eh Park Sanati Gohar Ofogh
Petrochemical Co.
**CONCEPTUAL, BASIC and DETAIL DESIGN
ENGINEERING OF STYRENE PARK OFFSITE**



BINA Consulting Eng. Co.

Document Title : Specification for Safety/Relief Valve

Document No. : EI027-000-ED-IN-SPC-006

Rev. R2

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STYRENE PARK OFFSITE

Document Title:

Specification for Safety/Relief Valve

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	R0	R1	R2	R3	R4	R5	R6		R0	R1	R2	R3	R4	R5	R6
1	X	X	X					41							
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5	X	X						45							
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1 GENERAL INTRODUCTION

1.1 Introduction

Creation and development of chain units of Styrene Monomer is the mission of Gohar Ofogh Industrial Park. This Company joint investment of four companies including JPC, Assaluyeh Sadaf Chemical, Kimia Sanaye Dalahoo and Entekhab Group and is located in Assaluyeh.

Feed and utility lines and network construction, a Styrene Monomer tank construction, Peroxide and its sidelong equipment warehouse are among this company's missions.

Some of the ongoing Projects of this company are:

ABS-Rubber project

ESBR project

EPS project

Poly Styrene

1.2 Purpose

This purpose of specification together with all the additional documents is to define the minimum requirements for the design, manufacture, inspection, testing and delivery of Pressure Safety/Relief Valves (PSVs) for use in STYRENE PARK OFFSITE Project.

VENDOR shall be responsible for design, sizing, selection, manufacture, testing of the pressure safety/relief valves. These rules are to be considered as minimum requirements, so it is expected from the VENDOR to submit to the Company, for agreement, all calculation sheets and possible solution that could give technical and or economic improvement. Any omission in these requirements shall not relieve the VENDOR of his responsibility to deliver pressure safety/relief valves and accessories which are complete, of proven design and conforms to Quality assurance requirements specified in the Project documentation.



This specification shall be an integral part of Contract and in case of contest about obedience to the requirement specified, a written deviation demand shall be submitted to the PURCHASER for Approval.

2 SCOPE OF WORK

2.1 Scope of Supply and Responsibilities

The VENDOR shall assume single point responsibility for all aspects of the supply of the Pressure Safety/Relief Valves including accessories specified. This shall include timely completion, liaison with the PURCHASER, liaison with any supply/sub VENDOR of specialist items, coordination of the fabrication, assembly, testing, performance guarantee and provision of a warranty for the pressure safety relief valves.

The VENDOR's scope shall as a minimum include the following:

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Design, engineer, manufacture, fabricate, assemble, test, supply and deliver the PSVs including all required accessories as defined in this requisition necessary for the safe and satisfactory operation of the equipment. This includes responsibility for the selection of components required to perform the functions described.

Supply of spare parts for start-up and commissioning.

Provision of all engineering documents and drawings for installation, operations and maintenance.

Obtain written approval from the PURCHASER before any change/substitution to the Pressure Safety Relief Valves specification is made.

Immediately inform the PURCHASER in cases where there is conflict between the referenced documents and/or any inadequacy or deficiency be identified in the specification and its referenced documents.

Provide details of the certified discharge coefficient for the quoted models and furnish sizing calculation based on design code ASME VIII, API RP 520 and the applicable sizing basis.

Ensure correct sizing and proper selection of PSV of quoted models for the service conditions prior to placement of order to VENDOR's Principal.

Providing the detailed General Arrangement (GA) drawing and weight of each PSV, prior to manufacturing of valves.

Providing access to VENDOR's facilities for inspection by PURCHASER/PURCHASER's representative throughout the fabrication, assembly and testing etc.

Providing Testing Procedure as per VENDOR's QUALITY PLAN for PURCHASER's approval 30 days prior to conducting the tests.

Perform testing as per VENDOR's QUALITY PLAN successfully, for all the PSVs.

Providing all final test certificates relating to the successful testing of all the PSVs.

Providing the final detailed drawings/documents, calculations, operating manual and maintenance manual.

Preservation, packing and transportation of the PSV to a destined location in IRAN. PURCHASER shall confirm final location.



2.2 Work Excluded

Installation of pressure safety/relief valves at site.

3 APPLICABLE CODES, STANDARDS AND ABBREVIATIONS

3.1 Precedence of Codes, Standards and Specifications

It is VENDOR's responsibility to inform PURCHASER of any deviations from or exceptions to the listed codes, standards and specifications. PURCHASER will take non-listing of exceptions or deviations by VENDOR as being in full compliance with the codes, standards and specifications listed.

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The following is the order of precedence of the specifications:

- i. Data Sheets
- ii. Project Specifications
- iii. Industry Codes and Standards

In case of conflict between the various codes, standards and the requisition the most stringent of the requirements shall generally govern. The **VENDOR** shall refer any such conflict and any other matter requiring further interpretation to the attention of the **PURCHASER** for solution and the **PURCHASER**'s interpretation shall be final.

The latest edition of the codes and standards listed in section 3.2 shall be used.

3.2 International Codes and Standards

American Petroleum Institute (API)

API 520 Recommended Practice for the design and installation of pressure relieving systems in refineries, part I "Design" and part II "Installation".

API-RP 521 Guide for pressure relieving and depressurizing systems

API STD 526 Flanged Steel Pressure Relief Valves

API STD 527 Commercial Seat Tightness of Safety Relief Valves with Metal to Metal Seats

American Society of Mechanical Engineers (ASME)

ASME B1.20.1 Pipe Threads, General Purpose

ASME B16.5 Steel Pipe Flanges and Flanged Fittings

ASME B16.10 Face to Face and End to End Dimensions of Valves

ASME B16.20 Ring-Joint Gaskets and Grooves for Steel Pipe Flanges

ASME B16.34 Valves – Flanged, Threaded, and Welding End

ASME B31.1 Power Piping

ASME B31.3 Chemical Plant and Petroleum Refinery Piping

ASME B46.1 Surface Texture


ASTM E94 Standard Recommended Practice for Radiographic Testing

ASME E142 Standard Method for Controlling Quality of Radiographic Testing

ASME VIII Rules for Construction of Pressure Vessels – Division 1

American Society for Testing and Materials (ASTM)

ASTM E94 Standard Recommended Practice for Radiographic testing

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ASTM E142 Standard Method for controlling quality of Radiographic testing

International Organization for Standardization (ISO)

ISO 4126 Safety valves general requirement

National Association for Corrosion Control (where applicable)

NACE MR-0175 Sulphide Stress Cracking Resistant Metallic Materials for Oil Field Equipment
Performance Test Code

PTC 25.3 Safety and Relief Valves – Performance test code

3.3 Definition

COMPANY Toase-ehe Park Sanati Gohar Ofogh Petrochemical Co.

PURCHASER Toase-ehe Park Sanati Gohar Ofogh Petrochemical Co.

VENDOR The company on which the order or contract for the supply of the equipment or services is placed and responsible for the design, manufacture, testing and supply of Multiphase Flow Metering Package as per this specification

Certifying The body or organization appointed by the COMPANY to Authority (CA) carryout design verification and quality assurance audit and/or inspection on behalf of the COMPANY

3.4 Associated Project documentation

EI027-000-ED-IN-DSH-0006 Data Sheets for Pressure Safety/Relief Valves

EI027-000-ED-IN-DCR-001 Instrument Design Basis

EI027-000-ED-IN-SPC-001 Technical Specification for Field Instruments

EI027-000-EB-PI-SPC-002 Piping Specification and Material Classes



4 PLANT SITE CONDITIONS AND UNITS OF MEASUREMENT

4.1 Environmental Condition

The Equipment shall be suitable for outdoor installation on offshore saline atmosphere at the following operation conditions:

Outdoor Conditions

Max. Ambient Design Temperature.	48 °C
Expected Extreme Temperature	55 °C

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Min. Ambient Temperature.	5 °C
Max. Relative Humidity	80 %
Min. Relative Humidity	65 %

Indoor Conditions

Design Temperature.	45 °C
Relative Humidity	80 %

4.2 Units of Measurement

Units of measurements shall be in accordance with the S.I. system except for the following:

Piping/tubing nominal diameter: inches

Pressure: bar a/g

5 FUNCTIONAL DESCRIPTION

5.1 General

The Pressure Safety Relief Valves shall be designed, fabricated constructed, assembled, painted, inspected and tested, packed, preserved and shipped in accordance with the requirements given in this specification and referenced documents. The valves shall be suitable for environmental conditions.

The type of Pressure Safety Valves (PSV) selected for each application shall be in accordance with the process conditions and API RP 520.

The type of PSV shall be:

Direct spring loaded conventional



Direct spring loaded seal/balanced bellows when variable back pressure is too high (> 10% of set pressure) or if the process fluid contains lethal or toxic substances or sour fluid.

Pilot operated type when the fluid is clean and operating pressure is higher than 90% of the set pressure when high accuracy of set pressure is required and when quick opening and quick closing is required and, in general, if no alternative is available.

In any case, a pressure safety valve shall be set not higher than the vessel's maximum allowable working pressure it protects, as specified in ASME section VIII Div.1.

5.2 Valve Sizing Criteria

The pressure safety/relief valves for both gas vapors and liquid service, with the exception for liquid thermal expansion application, shall be sized in accordance with formula and calculation methods shown in API-RP-520 standard.

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The valves for liquid thermal expansion shall normally be sized with a flow area of about 0.38 cm². Noise level shall be 85 DBA at 1m distance from PSV.

For each valve, the Manufacturer on the basis of the data indicated in the Technical Data Sheets and the features of the valves (i.e. real coefficient capacity) shall calculate the proper area and shall give the relevant calculation sheets.

Safety relief devices will be in accordance with ASME Section VIII Div. 1 applications as required.

5.3 Design and Construction Characteristics

The Pressure Safety/Relief Valves shall be fabricated in conformity with API STD 526 “Flanged Steel Pressure Safety/Relief Valves”. Flanges shall conform to ASME B16.5, Pipe Flanges and Flanged Fittings.

Body and flanges pressure rating shall be equal to or higher than the applicable piping class.

PSV connections shall be flanged type. Flange surface finish shall be compatible with the gasket Manufacturer requirements and the applicable piping class.

Minimum inlet flange diameter shall be 1 inch.

Thermal Relief Valve connections shall be screwed (3/4”M-NPT x 1” F-NPT according to ANSI B1.20.1).

PSV shall have full nozzle, with high lift, high capacity and a top-guided disc, arranged so that the nozzle and the parts comprising the disc are the only parts exposed to inlet pressure or to the corrosive action of the fluid when the valve is closed. Nozzle shall be easily replaceable.

PSV shall be provided with pressure-tight bonnets, except bellows type (vented). Bonnets and caps shall be of bolted type.

PSV in nitrogen and natural gas service shall have resilient seats.


Metal-to-metal seats shall be rated for commercial tightness, which permits a leakage in accordance with API RP 527, Commercial Seat Tightness of Safety Relief Valves with Metal-to-Metal Seats.

Pilot operated valve shall usually have the pilot pressure filtered tap on their body and be equipped with a field test facility. The field test facility shall be designed to test the pilot set pressure along with a pressure test source. The set pressure test shall not be requiring an over pressure on the valve and shall not be interfering with the automatic pressure relief function.

Open bonnet and a lifting lever shall be provided only if process fluid is air, steam or hot water.

Test gag shall be provided. Noise level shall be 85 DBA at 1m distance from PSV.

The Pressure Safety/Relief Valves shall be provided with lifting lugs for installation/removal. Calculations for the lifting lugs shall be submitted with the bid for weight over 500kg.

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An arrow in the direction of the flow shall be on the body of the valves. All the valves shall be provided with a permanently fixed metal nameplate, in AISI 316, bearing the following data to be marked indelibly:

- a) Manufacturer's name, serial and model number
- b) Valve identification tag
- c) Body, spring and nozzle material
- d) Dimensions, rating and facing flanges
- e) Orifice type and size
- f) Capacity of relevant overpressure
- g) Set pressure
- h) Design temperature
- i) Code stamp
- j) Back pressure
- k) Compatibility with NACE-MR-0175 standard latest edition.

5.4 Bellows

Bellows shall be provided when the variable back pressure is $> 10\%$ of the set pressure or when the process fluid is corrosive sour gas.

The material to be used for the bellows shall be as follows:

Standard service: AISI 316 L Stainless steel

Corrosive service (sour gas): Inconel



Alkalines, salts services: Monel

For pilot operated safety valves, if necessary, **VENDOR** shall provide appropriate facility on the valves/pilots for connecting the site calibration kit.

5.5 Materials

All material or component coming in contact with sour gas shall comply with the requirements of NACE-MR-0175 latest edition. The material of the components wetted by the controlled fluid shall be suitable for operation at process conditions indicated on the PSV data sheets. Body materials shall be in accordance with the piping classes.

Valve trim materials (nozzle, disc, holder, stem guide, blow down ring, ring pin and bushing) shall be as a minimum AISI 316 SS unless process condition requires a higher grade or special materials. Deposits of satellite ledges or hardened materials shall be utilized for high-pressure services or when proposed by the Manufacturer.

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The material of spring will be as follows:

AISI 316 for temperature of the discharge fluid between -240°C and -46°C

Low temperature carbon steel +zinc coated bichromated from -46 °C to - 29°C

Carbon steel + zinc coated bichromated from -29 °C to 230 °C

Tungsten alloy steel above 230 °C.

Valves in sour service shall have Inconel spring as a minimum.

The O-ring pressure seal shall be selected according to the conditions of pressure, temperature and composition of fluids, VITON or BUNA-N as a general rule. Seat pressure seal are used in the following cases:

- when set pressure is approaching the operating pressure by less than 10% of the set pressure for gas and 15% for liquid
- when there is a risk of freezing during operation
- toxic or corrosive gases
- vibration
- hydrogen
- Bolts and nuts for the body-bonnet assembly shall be made in accordance with the piping classes.
- All the pneumatic connections shall be made by means of AISI 316 L stainless steel tubing and AISI 316 double compression fittings.

5.6 PAINTING

Painting/Coating shall be performed according to project document no. Vendor shall note that all parts and accessories of valve (bolts, studs, nuts, etc.) shall be coated and suitably painted as per project document no



6 INSPECTION AND TESTING

6.1 General

The **VENDOR** shall provide a testing program, which shall reflect the specific requirements for the equipment specified.

The **VENDOR** shall give **PURCHASER** or his designated agents a minimum of 3 weeks' notice for attending certain critical witness inspections required by **PURCHASER**.

The **VENDOR** shall conduct a preliminary function test to ensure all parts of the equipment are operating satisfactorily prior to the arrival of the **PURCHASER**'s representative and/or nominated agent.

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If it is found necessary to dismantle any equipment during a test, because of malfunction, the test may then be invalidated, and a further test shall be required after the repair of the fault.

The VENDOR shall furnish at his expense all spares and consumables required during the testing of the equipment and systems. Rectifying of defects revealed by such tests shall be at the VENDOR's expense. All faults shall be rectified before proceeding further.

The VENDOR shall provide all the identified certifications and relevant cost, including but not limited to Material Certification, Third Party design verification, third party inspection & certification.

VENDOR to note that PURCHASER shall engage a Design Verification and Certification Agency (DVC). VENDOR shall be obliged to provide all relevant documents and information required by the DVC to verify that the equipment/ material being supplied is in compliance to the requirements of the Purchase Order Specification and attachments.

VENDOR shall submit an Inspection and Testing Procedure (ITP) for review and approval by PURCHASER prior to the start of manufacture. The ITP shall as a minimum cover:

- Manufacturing sequence, including inspection.
- Proposed physical inspection of equipment.
- Proposed check of documentation.
- All safety valves and its components shall be subjected to a visual check to verify quality of workmanship and general conformance with all requirements of the purchase requisition. All associated documentation and certification shall be reviewed for completeness.

VENDOR shall submit his proposed test procedures to PURCHASER for approval at least 30 days before the scheduled test date.

Inspection shall be in no way release the Vendor from his responsibility to materials, workmanship, performance, conformance and completeness to the specification for the equipment.

Such inspections shall not relieve the VENDOR/Manufacturer from his responsibilities concerning materials, work effected and the performance of the equipment supplied.



The Vendor shall guarantee that the equipment furnished is free from fault in design, materials and workmanship and will perform satisfactorily in accordance with the service and performance conditions specified.

The equipment shall be inspected to ensure it is complete, has been manufactured and assembled to specification, approved drawings and to a satisfactory standard.

6.2 Factory Acceptance Test (FAT)

VENDOR shall prepare and submit FAT procedure to PURCHASER for approval.

The FAT (factory acceptance test) shall be performed in accordance with API 526 and 527.

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Company/Contractor representatives might witness tests.

The Company/Contractor reserves himself the right to order particular tests to be agreed upon or to waive tests, if so desires.

6.3 Leak and Pressure Testing

Pressure safety valves in hydrocarbon liquid, vapor and gas service shall be tested for hydraulic test, tightness test (seat/plug), set pressure test in the Manufacturer workshop. Pressure safety valve bodies shall be pressure tested with air before set pressure and leakage tests are conducted.

The valve body shall be tested as follows:

Inlet side shall be tested 1.5 times the design pressure of the primary pressure parts

Outlet side shall be tested at 1.5 times the maximum allowable back pressure specified by the Manufacturer

The bellows tightness test shall be carried out in accordance with the Manufacturer standard

The maximum allowable leakage at 90% of set pressure shall be 0.008Nm³/d (20 bubbles/min through a 8 mm OD x 0.89mm wall thickness tube at 13 mm water head), which permits a leakage in accordance with API RP 527, Commercial Seat Tightness of Safety Relief Valves with Metal-to-Metal Seats.

6.4 Test Certificates

Unless otherwise required in other contractual documents, valves shall be supplied with the following certificates:

Analysis of chemical and physical properties of the materials of parts under pressure and in contact with the process medium. (Material certification)

Hydrostatic tests.

Seat tightness test results.

Internal workshop test certificate including all other shop test carried out by Manufacturer.



Coefficient of discharge certification issued by an authorized Agency.

Conformity certificate for material subject to NACE-MR-0175 requirement.

7 PRESEVATION, PACKING AND SHIPMENT

7.1 Packing

The equipment shall be securely packed for shipment from VENDOR's location to the actual equipment destination. All items must be protected from handling damage either by protective packing with cartons, crates, etc. or by securing to pallets.

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All material must be packed in a way that handling with forklift truck or crane is possible. If there is a risk of damage to equipment and other appurtenances during transportation, they shall be disconnected and tagged. All components shall then be securely packed as above.

Equipment shall be adequately packed to withstand at least 12 months storage at construction site prior to installation. The VENDOR shall recommend any necessary procedures to be imposed during storage.

Spare Parts shall be packed separately and clearly marked “Spare Parts”.

Weights (in kg) and center of gravity diagrams should be marked on package as per appendix 4.0.

Fragile instruments, as deemed necessary by the Vendor or/and at contractor request, shall be removed, tagged and crated, in waterproof boxes.

All openings, flange faces, threaded connections, or other components subject to mechanical damage and/or corrosion shall be protected adequately. Such protection shall consist of tight plastic plugs, peel off varnish for machined parts, sealing with waterproof tape or enclosing with temporary metal housings.

7.2 Preservation

All equipment shall be thoroughly cleaned internally and packaged free of loose foreign materials. VENDOR shall replace all parts which have defects due to loose debris left from fabrication / shop tests of his own cost.

All surfaces not painted with the prescribed painting system, shall be coated with corrosion protective grease for transportation and 12 months storage on Iran, Persian Gulf Yard.

All openings shall be covered or capped to protect the inside from dust, rust and moisture. Dry ant shall be enclosed in the package for absorption of moisture.



Flanged openings shall be provided with gasket metal closures securely fastened with bolts or clamps.

7.3 Marking

The VENDOR shall attach a packing list, in a waterproof enclosure, to the outside of the package.

The packing list shall clearly show:

- PURCHASER’s order number
- Purchase Order item number.
- Partial or complete delivery for each order number.
- Description of Contents
- Tag number of Safety/Operated Valve

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The **VENDOR** shall also provide a list, within the packing list, showing rust preventatives used and where. The rust preventatives list shall give instructions for removal of preventatives where required, and also necessary procedures to be imposed during storage.

VENDOR shall provide a Delivery Specification, which shall describe all loose items furnished in a completely or not completely assembled condition. Delivery Specification must clearly indicate **PURCHASER's** order number and item number for each loose item shipped by the **VENDOR**.

One copy of the delivery specification shall follow the package, one copy to be sent to the receiving port and one copy to be sent to the **PURCHASER**.

7.4 Tagging & Name plating

All items of equipment and material are to be clearly tagged via a nameplate.

8 WARRANTY

VENDOR shall have the final and total responsibility for the design and performance of all equipment supplied under this specification. **VENDOR** shall warrant the equipment furnished by him and the performance of said equipment in accordance with this specification. The warranty shall cover both, the supply of material and manpower to make good any defective components or equipment offshore.

The Warranty period shall extend for a minimum of 1 year after the unit is placed into operation but not more than 30 months after delivery.

VENDOR shall warrant that the system shall remain commercially available for at least 10 years after the purchase and the availability of spares and services for all parts for a minimum of 5 years thereafter.

9 DOCUMENTATION



9.1 General

As a minimum, **VENDOR** is responsible to provide documentation for the equipment. **VENDOR** is responsible for all documentation in strict accordance with the requirements of the specifications. The **VENDOR** shall furnish soft copies of drawings/documents that are of suitable first generation quality. Drawings that are, in **PURCHASER's** opinion, not of suitable quality will be returned to the **VENDOR** for resubmission or at **PURCHASER's** option may be redrafted by **PURCHASER** or their representatives at the **VENDOR's** expense.

The **VENDOR** shall submit all approval documents (design calculations, detailed drawings etc.) within the time frame as specified after receipt of purchase order.

Fabrication shall not commence until calculation, drawings are approved by **PURCHASER**. **VENDOR** shall obtain and provide all **VENDOR** data, drawings, test results as specified in codes, regulations, standards and specifications including, but not limited to:

- a) All material and final inspection test reports and certification certificates.

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- b) General arrangement drawings including plans, elevations, sections, details and bills of material.
- c) Parts list, recommended spare parts inventory, operating and maintenance instructions.

VENDOR shall complete the equipment weight/Centre of gravity datasheet as per APPENDIX 4.0 and submit along with the bid.

In addition to hard copy, the VENDOR shall provide two (2) sets of CD-ROM, which shall include operation and instruction manual, as built drawings, result of factory test and commissioning test. CD-ROM documentation shall be prepared in PDF format and indexed.



9.2 Documents Required with Bid

The following documents shall be included with the bid:

- a) Overall scope definition.
- b) Drawings detailing package envelope, including installation and maintenance requirements, and interface connections.
- c) List of references.
- d) Component list with make and type.
- e) Dimensional outline drawings with weights and clearance required for maintenance.
- f) Installation details,
- g) Specification and datasheets
- h) List of recommended spares and consumables, including calibration kits for two years operation.

The documents and drawings to be submitted after order shall include the following, over and above those listed above,

- a) Detailed GA drawings and weight of valve and actuator with maintenance clearance requirement.
- b) Final Bill of Material with component list, make and model numbers.
- c) Instrument Datasheets and Sizing Calculation
- d) Response Time Calculation
- e) Spare Parts list,
- f) Quality Control Procedure
- g) Internal Testing records dossier
- h) FAT Procedure and report
- i) Commissioning spare parts

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- j) Preservation procedure
- k) Installation, Start up, Operation & Maintenance Manual
- l) Packing List

9.3 Documents for Review/Approval

Consistent with the attempt to minimize documentation only documents, which provide key information, will be required for review by the PURCHASER. In addition, in order to verify compliance with the project requirements, certain other documents will also be subject to PURCHASER's approval. The scope of documentation for review will be discussed and agreed jointly by the PURCHASER and the VENDOR during the technical discussions (following the Technical Bid submission).

10 SPARE PARTS

10.1 General

Recommended spares shall take into account related factors of equipment reliability, cost of parts and availability of equipment service facilities.

All spare parts supplied by VENDOR shall be wrapped and packaged such that they will be preserved in the original as-new condition under storage conditions, which are to be anticipated in Middle East Region. They shall be properly tagged and coded for ease of identification as to intended equipment usage at a later date. They shall further be packaged separately, clearly marked as "Spare Parts" and transported with the equipment.

Packing lists shall be provided, so that the parts can be stored without uncrating if so desired.

10.2 Spares



VENDOR shall provide a recommended spare parts list for commissioning, and start-up. PURCHASER will decide the final list of commissioning and start-up spares which to be supplied by VENDOR as part of the package. VENDOR shall also provide a recommended two years operation spare parts list with price. The prices shall be listed itemize and shall be valid for the period as indicated in commercial terms and conditions.

10.3 SPIR

VENDOR shall provide an SPIR database using the format of the attached three sheets as a guide. SPIR database shall be submitted to the PURCHASER in electronic media using Excel spreadsheet.

11 VENDOR TECHNICAL ASSISTANCE

As a minimum, VENDOR technical assistance is required for equipment installation, pre-commissioning, commissioning, offshore hook-up, site acceptance test and training.

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VENDOR shall provide procedures and checklist for equipment pre-commissioning and commissioning including parameters for performance acceptance test. VENDOR to quote rates (including mobilization, daily rates and response time) offshore assignment. For offshore assistance, the VENDOR personnel shall possess a valid medical and sea-survival training certificate.

11.1 Commissioning

The VENDOR shall perform liaison with other VENDORS, if required PURCHASER's personnel to ensure successful commissioning. The VENDOR shall also prepare Commissioning procedures and necessary checklist prior to the activity. All results shall be recorded and later documented as part of documentation deliverables.

The VENDOR shall ensure that at all times, their personnel adhere to good and safe engineering practices. These include the use of safety attire and harness during all activities. Any incident shall be immediately reported to the COMPANY or its authorized representative.

12 QUALITY ASSURANCE / QUALITY CONTROL

The Vendor shall have in effect at all times, a QA/QC program, which clearly establishes the authority and responsibility of those responsible for the quality system. Persons performing quality functions shall have sufficient and well defined authority to enforce quality requirements that initiate, identify, recommend and provide solutions to quality problems and verify the effectiveness of the corrective action.

Vendor's proposed quality system shall fully satisfy all the elements of ISO 9001, "Quality Systems – Model for Quality Assurance in Design/Development, Production Installation and Servicing", ISO-9003, "Quality Systems – Model for Quality Assurance in Final Inspection and Test" and ISO-9004, "Quality Management and Quality System Elements – Guidelines." The quality system shall provide the planned and systematic control of all quality-related activities performed during design.



The VENDOR shall identify in purchase documents to his SUBCONTRACTOR all applicable QA/QC requirements by the PURCHASER.

On request, Vendor shall provide evidence of its QA/QC surveillance of its SUBCONTRACTORS activities. If selected SUBCONTRACTORS have ISO 9001 and ISO 9002 year 2000 certification, as required for contracted scope, then copies of these certifications are to be provided for PURCHASER's review.

The COMPANY and CONTRACTOR may elect to waive their audits in favor of ISO 9001 register audits. Any contracted service not covered in ISO 9001/9002 certification will be subject to PURCHASER audit requirements.

The VENDOR shall assume unit responsibility and overall guarantee for the supply.

The VENDOR shall transmit all relevant Purchase Order documents including specifications to his SUBCONTRACTORS or SUBVENDORS.

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It is the **VENDOR'S** responsibility to enforce all Purchase Order and Specification requirements on his **SUBCONTRACTORS** and **SUBVENDORS**.

The **VENDOR** shall submit all relevant **SUBVENDOR** and **SUBCONTACTOR** drawings and engineering data to the **PURCHASER** for review and approval. All comments from the **PURCHASER** shall be incorporated in the **SUBCONTACTOR/VENDOR** design/supply/works. Any conflicts and/or discrepancies shall be brought to the notice of the **PURCHASER** for resolution.

The **VENDOR** shall obtain and transmit all **SUBVENDOR** and **SUBCONTACTOR** warranties to the **PURCHASER**, in addition to the system warranty.