Petroleum Development Oman L.L.C.

Specification for Construction Activities on Oil, Gas and Utility Facilities Projects

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ii Revision History

The following is a brief summary of the most recent revisions to this document.

Version No.	Date	Author	Scope / Remarks
Version 3.0	Sept 2023	UEAN	Revised and updated
Version 2.0	Oct 17	UEP6	Revamped and updated
Version 1.0	Jul 06	UEV11	Revised and reformatted
Version 0	Apr 88	EPN3	Original (ERD-26-02)

iii Related Corporate Management System (CMS) Documents

The related CMS Documents can be retrieved from the Corporate Business Control Documentation Register ***CMS***.

Code	Corporate Management System (CMS) Document
CP-117	Project Engineering Code of Practice

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1 Introduction

1.1 Scope

This Specification is for construction activities to be carried out in Oil, Gas and Utility Facilities.

1.2 Applicable Standards, Specifications and Codes

Each section of this Specification details the applicable standards, specifications and codes listed under 'Related Documents'. These related documents are specific to the section being covered and it is the responsibility of the User to ensure he is using the most current version by referencing the 'PDO Guide to Engineering Standards and Procedures' (GU-611), unless specified differently in the Scope of Work.

1.3 Language and Units of Measurement

The English Language and the SI System of units shall be used throughout for all documentation and drawings, etc. and for charts and scales on instruments, unless otherwise specified.

1.4 Conflicting Requirements

In the event of inconsistency between that stated in the Contract and this and other specifications or design engineering practices the following shall prevail in order

- Specifications as detailed in the Project Schedules
- This Specification
- Royal Dutch Shell Group Design Engineering Practices (DEP)
- International Codes / Standards

1.5 Reference Documents

1.5.1 Project Documents

When using the following related documents, reference shall also be made to the Project key documents:

- Scope of Work
- Drawings Issued Approved for Construction
- Schedules
- General Conditions for Construction Works

1.5.2 PDO Codes of Practice, Specifications, Procedures and Guidelines

The following reference list contains the key documents that shall be referenced when using this Specification.

Nevertheless, each section of this Specification shall contain its own specific reference list.

CP-117	Project Engineering Code of Practice
CP-122	Health, Safety and Environmental Management System
CP-123	Emergency Response Documents Part I, Code of Practice
CP-223	Opportunity Realisation Code of Practice
GU-363	Guidelines for Work at Height & Access
GU-611	PDO Engineering Standards and Procedures
PR-1065	Emergency Response Documents Part II – Company Procedure
PR-1666	Engineering and Operations Document, Drawing and Data Management Procedure
SP-1131	Plant Lifecycle Information Plan (Handover and As-Built Documentation)
SP-1171	Specification for Quality Management System Requirements for Product and Service
SP-1284	Specification for Signs & Signboards – Standards Signs Catalogue
SP-1256	HSE Specification – Camps, Offices, Laboratories, Workshops and Industrial Safety
SP-1230	HSE Specification – Medical Examination, Treatment and Facilities
SP-1231	HSE Specification – Occupational Health
SP-1232	HSE Specification – Public Health
SP-1234	HSE Specification - Personal Protective Equipment
SP-1257	HSE Specification – Work at Height & Access

1.6 Definitions

1.6.1 General

Definitions and abbreviations used in this document are as follows:

Shall	the word 'shall' is to be understood as mandatory
Should	the word 'should' is to be understood as strongly recommended
May	the word 'may' is to be understood as indicating a possible course of action
The Company	Petroleum Development Oman LLC of Muscat, Sultanate of Oman
User	the specialist engineer, or consultant who applies this standard in the execution of a project
The Consultant	the party to the Contract with the Company who is responsible for providing the design, engineering, and other related consultancy services under the Contract
The Contractor	the party to the Contract with the Company who is responsible for the construction and other related works specified in the Contract. On occasion, for example in ''turn- key contracts', the Contractor may be responsible for the duties of both the Consultant and the Contractor.
Company Site Representative	a person appointed by The Company to act generally in respect of a Contract at the site.

1.7 Abbreviations

The following abbreviations are used in this Specification.

AFC	Approved for Construction
API RP	American Petroleum Institute Recommended Practices
ASME	The American Society of Mechanical Engineers
CCMS	Certification and Completion Management System
CEP	Contract Execution Plan
CQP	Contract Quality Plan
CSSRP	Construction Site Safety Recommended Practices
DEP	Shell Group Standards for Design and EngineeringPractice

GU	Guideline Document
HSE	Health, Safety and Environment
IOGP	International Association of Oil & Gas Producers
PDMS	Project Document Management System
PDO	Petroleum Development Oman LLC
PR	Procedure Document
QA	Quality Assurance
QC	Quality Control
SP	Specification Document

2 Construction Site Safety Recommended Practices

Safety performance for contracted work performed at site or fabrication yards continues to be a challenge in the Oil and Gas industry. To help drive improvements in contractor (and sub-contractors) safety performance, a set of recommended practices were produced for Hazardous activities carried out at construction sites. The identified recommended practices were developed based on actual incidents and near misses that have occurred in the Oil and Gas industry. PDO construction contractors shall follow the construction site safety recommended practices as stipulated below.

The International Association of Oil & Gas Producers (IOGP) have developed 13 standardized minimum recommended practices for addressing safety risks associated with fatality potential or significant incident hazardous activities common to construction sites. The selection of hazardous activities was not intended to be comprehensive, and the recommended practices are not detailed procedures; but rather provides essentials for preventing significant and potential fatality incidents from occurring and the recommended practices are also consistent with the Life Saving Rules.

Each of the Construction Site Safety Recommended Practices is divided into three sections (a) Definition (b) Recommended Practice (c) Related Life Saving Rule (LSR).

The 13 CSSRP are:

1. Confined Space Entry
2. Construction Traffic Interface
3. Dropped Objects
4. Energy Isolation / Lock-Out Tag-Out
5. Housekeeping
6. Job Safety Analysis / Permit to Work
7. Lifting and Hoisting
8. Personal Protective Equipment
9. Scaffolding
10. Simultaneous Operations
11. System Testing
12. Working at Heights
13. Working with Electricity

For more details log into the IOGP website *www.iogp.org*

IOGP has an excel tool to help assess construction sites against the above noted recommendations, the tool can be used by either PDO Construction management team or Contractor Construction management team for monitoring and compliance.

PDO project team to ensure that the learnings from previous Process Safety Incidents are addressed and cascaded to the construction contractors. Before issuance of HSE commencement Certificate, PDO Project team to ensure that the AIPSM incident data book has been reviewed in the HSE workshop for lessons relevant to construction.

3 Scope of Contractor's Activities

The scope of the Contractor's Activities shall be stated in the Tender Documents and Project Schedules.

3.1 Facilities and Support

3.1.1 Areas Allocated to the Contractor

Company shall issue without charge as is a plot area to Contractor for all temporary facilities and utilities as further detailed herein. Contractor shall not exceed the boundary limits of the allocated areas without prior Approval of the Company. Any Approved expansion of these areas shall be at Contractor's cost. Contractor shall be responsible for restoring the plot area to original condition upon Completion of the Work.

The areas allocated for Contractor's industrial facilities and lay down areas shall be used solely for industrial purposes such as prefabrication, maintenance, warehousing, storage, or similar activities. In addition, Contractor shall erect site toilets, which shall be regularly maintained in a hygienic condition, and sufficient shade areas for workers. A prayer room/area shall also be provided within the industrial facilities areas.

All portacabins provided by Contractor to the industrial facilities and laydown areas shall be of a fire-retardant type.

The area allocated for Contractor's accommodation camp, offices and messing facilities shall be levelled and perimeter fenced by other contractor prior to Contractor's mobilisation to allow expedited construction of Contractor's facilities. Contractor shall be responsible for further developing the areas allocated with roads, pedestrian pathways, drainage, lighting, and all facilities as required for performance and completion of the Work in line with Company's standards.

3.1.2 Site Facilities and Equipment - General

Contractor shall be responsible for the provision, mobilisation, installation, maintenance, operation and de-mobilisation of all Facilities, equipment, and services necessary for the performance and completion of the Work including, but not limited to, the following:

- Offices and accommodation camp for Company, Contractor and Sub-contractors,
- worker transportation to and from Site,
- workshops, fabrication shops, warehouses, medical center, pre-casting yards and industrial yards,
- temporary (enabling) works, construction plant, cranes, vehicles (including

ambulances), tools, equipment, spare parts, and consumables.

- All Construction Equipment, including plant, cranes, vehicles, or any other mechanical device shall be maintained in proper and safe working order to the satisfaction of the Company and in accordance with Company.

  specifications. Contractor's mechanic workshop and facility on Site shall be capable of maintaining and servicing all Contractor's vehicles (including Subcontractors').
- Contractor shall be responsible for the security and safety of the Site, both in terms of personnel working on Site and Third Parties who could gain access to the Site.

3.1.3 Site Utilities - General

Contractor shall provide Site utilities that will enable the Works on Site to proceed without hindrance and that shall ensure the habitability of the Work environment. This shall include but not be limited to:

- The provision, mobilisation, maintenance, operation and demobilisation of all utilities, air, gas, electricity, water, fuel, oil, and other consumables required for the performance and completion of the Work under the Contract and for all Site Facilities.
- The provision and maintenance of appropriate on-site sanitation, washing, eating and shade facilities, including at remote sites and moving work-fronts.
- The provision of all utilities required at offices, workshops, testing laboratories, fabrication workshops and accommodation facilities that will allow the continued safe work and habitation of the occupants. This shall include, but not be limited to:

  a. Electricity with metering facility
  b. Water
  c. Fuel
  d. Fire detection and protection measures
  e. Telecommunications
  f. HVAC
  g. Waste disposal

3.1.4 Communications at Site

3.1.4.1 Telecommunications

Contractor shall approach the national service providers to setup telecommunication facilities (LAN and telephony) for the duration of the Works for Contractor's and Other contractors use. Contractor shall be responsible for all engineering, procurement and construction / installation Works associated with these activities.

3.1.4.2 On-Site Portable Radio

Contractor shall arrange for local portable radios, (all radios shall comply with the hazardous area certification requirements), for communication within the Site area.and during Pre-Commissioning & loop Checks and up to Completion of Commissioning.

3.1.5 Site Security and Fencing

Contractor shall fence and make secure all camp, office, and industrial facility areas of the Site, including warehouses and laydown yards for Contractor and Company materials. Contractor Shall provide CCTV system to the material storage yard.

3.1.6 Signboards

Contractor shall erect a Project signboard at all Work locations detailing Contract title, Contract numbers, Contractor name, Contract Holder name, Company Site Representative name, duration of the Contract and safety statistics. Safety statistics shall be updated daily on the signboards.

3.1.7 Medical Facilities

Contractor shall provide and maintain medical facilities as specified in SP1230,CP123 and PR1065 “Health management; medical conditions of Contracts” and “Emergency Response” when Contractor’s dedicated camp facilities are opened. Contractor shall ensure that all medical facilities provided are available to all Company residents and visitors.

3.1.8 Welfare

Contractor shall provide and maintain welfare facilities for Personnel. These facilities shall be designed to cater for the number of Personnel based at Site and shall include but not be limited to:

- Sports grounds for football, volleyball and others.
- Television rooms including channels broadcast in the languages of the Personnel mobilised to Site.
- Access to retail services.
- Daily laundering of coveralls and personal clothes for all workforce

3.1.9 Demobilisation of Contractor Facilities

Contractor shall be responsible for demobilising all Facilities and temporary services constructed by Contractor upon completion of the Work, unless otherwise instructed by Company.

Before demobilising any facilities and temporary services Contractor shall check with the Company Site Representative to ascertain if the facilities are required for a longer period.

3.2 Materials and Equipment Management

Contractor shall provide suitable warehousing and hard stand areas, for all Materials, and take all precautions necessary to protect the Materials and or Equipment from damage or deterioration caused by weather conditions, construction and installation activities or Third Parties. Contractor shall establish an equipment preservation and maintenance management program that complies with all equipment preservation and maintenance instructions issued by Vendors and as perMinimum Preservation Requirements.

3.3 Construction Consumables and Materials

Contractor shall supply all construction consumables, testing materials and tools required for performance and completion of the Work, unless specific items are expressly stated as being supplied by Company or other contractor(s). Contractor shall also supply all consumables, testing materials and tools required for performance and completion of the pre-fabrication and fabrication activities identified as part of Contractor's scope of Work.

3.4 Scaffolding and Staging

The Contractor shall provide, install and take down all necessary scaffolding and staging required for the execution of the Work. Scaffolding and staging shall comply with SP-1257 - HSE Specification – Scaffolding, Working at Heights or Over Water, Lifting Operations and Earthworks and GU-363 – Guidelines for the Use of Scaffolding.

The Contractor shall have a dedicated Scaffolding Supervisor on site to oversee all scaffolding works and ensure that all scaffolding meets The Company approval before use.

3.5 Cathodic Protection

The Contractor shall ensure that work carried out near facilities under Cathodic Protection shall be in accordance with SP-1234 – Safe Working Procedure for Cathodic Protection Systems.

No work shall be carried out without advance knowledge and approval of The Company Cathodic Protection specialist or Corrosion Engineering Department.

3.6 Planning and Scheduling

Contractor shall follow accepted Construction and Project Managementconventions and shall ensure proper planning, scheduling and implementation of the construction works. This shall include but not be limited to:

1. Prepare, and obtain Company's Approval for a fully resourced construction Schedule for the Project from Contract award through to Completion (end of pre-commissioning and commissioning support) with clearly defined

scope of work, including project objectives, deliverables, and agreed timelines.

2. The Schedule shall take into account and clearly indicate critical path activities determining the overall Project duration.
3. Delivery times for critical materials and long lead items shall be indicated separately on the Schedule. The Schedule shall consider detailed Work Breakdown Structure (WBS) for manageable tasks & activities.
4. Possible constraints on the construction Schedule imposed by any Competent Authority or any other requirements such as permit to work constraints, holidays.
5. Contractor shall conduct its Work in accordance with documented plans and procedures. These plans and procedures shall address, but not belimited to, the following activities:
    - Contract Execution Plan (CEP)
    - Contract Quality Plan (CQP)
    - Procurement Management Plan
    - Hydrotest plan
    - Contract Work Plan & Program
    - Information Management plan
    - Contract Health, Safety & Environmental Management Plan
    - Contract Materials Handling Plan (including Logistic Plan & Materials Receipt Procedure)
    - Construction Management Plan (part of CEP)
    - SAP Data
    - Interface Management Plan
6. Contractor shall manage the interfaces between Contractor, Company, Subcontractors, Other contractors and any other entities connected with the Work.

3.7 Contract Execution Plan

Contractor shall develop and maintain a Contract Execution Plan (CEP) which shall fully document Contractor's management functions for the Project.

The CEP shall document Contractor's Project management strategy and is to demonstrate that Contractor has a comprehensive plan in place to a suitable level of details to efficiently perform and complete the Work on schedule without compromise to safety, quality or scope. The Contract Execution Plan shall be maintained and updated during the execution of the Work and shall include, but not

be limited to the following:

a) Project management structure and procedures.
b) Project risk management
c) Reporting management plan and procedures
d) Roles and responsibilities of Key Personnel and other essential Contractor Personnel
e) Performance management procedures
f) Change control.
g) Procurement management and procedures
h) Procurement control (inspection, expediting and logistics
i) Construction management structure, procedures and organization
j) Testing and pre-commissioning procedures and organization
k) Commissioning assistance
l) Schedule and cost planning, monitoring and reporting.
m) Plan for audits and reviews
n) Quality Assurance and Quality Control
o) Health, Safety and Environment (HSE) plan
p) Logistics including transport management and supervision.
q) Omanisation and Local Community Contractor (LCC) management

3.8 Maintenance of As-Built Drawings

The Contractor shall maintain the AFC drawings. The maintenance shall be in accordance with PR-1666 – Engineering and Operations Document Drawing and Data Management Procedure and SP-1131 – Plant Lifecycle Information Plan.

Approval of the changes shall be recorded by signature of PDO Project Manager / Site Representative on the marked-up prints.

3.9 Quality Assurance and Quality Control

Contractor shall provide all necessary quality assurance and quality control services required to ensure the Work is executed as per Contract requirements,Contractor's Quality Plan (QCP) and in accordance with SP1171.

3.10 LCC`s and ICV

Contractor shall be required to comply with the requirement to work with the Local Community Contractors (LCCs) in addition to compliance with Company In Country Value (ICV).

3.11 Constructability Reviews

Constructability reviews are held by other contractor's (more specifically the engineering and procurement contractor) immediately after the 30% and 60% model reviews. Construction contractor shall provide selected representatives to participate in the reviews as advised by Company and to be of sufficient seniority to

ensure meaningful discussion and decision making as a minimum Contractor's construction manager shall attend. Furthermore, Constructability review can also be conducted by the construction contractor after award of the contract at site.

3.12 4D PDMS Construction Management Solution

For large projects, as per CP223, contractor is required to utilize AVEVA's 4D PDMS Construction Management Solution (AVEVA ERM – Enterprise Resource Management and AVEVA NET (4D) Player), or an equivalent 4D PDMS Construction Management Solution as advised by Company, throughout the performance and execution of the Work. Using AVEVA 's 4D PDMS Construction Management Solution it is intended to:

- Allow a visual representation of the construction sequence (AVEVA ERM and AVEVA NET 4D Player).
- Enable development of Installation Work Packs (IWP's) linked to the construction schedule, materials and other resources to control and manage construction work scopes and to do this in the context of the 3D model (AVEVA ERM).
- Enable review of the construction progress and status by utilizing a color-coded progressing system interfacing with the 3D PDMS model, along with actual construction progress reporting against installation work packs (AVEVA ERM and AVEVA NET (4D) Player).

3.13 Mechanical Completion and Precommissioning

Certification and Completion Management System (CCMS) is a web-enabled Project Completions Management System.

CCMS shall be the only Mechanical Completion tool utilized by Contractor to monitor & track Systems leading to Mechanical Completion, Pre-Commissioning and handover to Company's Commissioning and Start-up Team.

3.13.1 Mechanical Completion

Mechanical Completion is a milestone achieved when all 'A' scope construction and installation activities are completed.

Inspection and testing activities performed by Contractor to achieve Mechanical Completion shall not require equipment or systems to be energized and fully function tested.

Subsystem Mechanical Completion shall require the following be fulfilled:

- All construction activities have been fully completed.
- All 'A' scope mechanical completion test and inspection records have been fully completed, approved and signed off by Contractor and Company and uploaded into CCMS.

- All 'A' punch list items are completed and closed out in CCMS.

On achievement of Mechanical Completion and clearing of the Category "A" punch list items, Pre-Commissioning 'B' scope activities shall then commence.

3.13.2 Pre-Commissioning

Contractor is responsible for undertaking all 'B' scope Pre-Commissioning activities after 'A' scope Mechanical Completion.

Pre-Commissioning activities typically require equipment or systems to be energised, but do not require the introduction of process fluids.

Contractor shall be responsible for providing, but not limited to the following: -

- All consumables, test equipment and tools required for all Pre-Commissioning activities.
- Temporary electrical power supplies for Pre-Commissioning activities.
- Vendor call-offs to support Pre-Commissioning activities as applicable.
- All 'B' scope Pre-commissioning test and inspection records have been fully completed, approved and signed off by Contractor and Company and uploaded into CCMS.

3.14 Red Line Mark-up & As-Built Documentation

All Approved for Construction (AFC) drawings shall be red line marked up during the progress of the construction work on a daily basis and COMPANY expects the red- line mark-ups before the pre-commissioning. All required input in drawings/documents pertaining to various construction phases (viz. Engineering, Fabrication, Construction, Installation, etc.,) shall be captured, managed and documented as Red-line mark-up by the CONTRACTOR in accordance with PR-1150 and shallbe submitted to COMPANY with the same revision of AFC with the status of RLM to facilitate the compilation of As-built drawings/documents. Management of all As- built drawings/documents status up to the project close out shall be the responsibility of other contractor.

3.15 Demobilisation from the Site and Camp

Contractor shall produce a final demobilisation plan that shall indicate the processes to be followed for the final demobilisation of personnel, plant, equipment and all Site and Temporary Facility construct/destruct activities. Contractor shall reinstate all areas utilised to a safe, environmentally clean condition which shall be subject to Company Approval.

4 Civil Works

The Contractor's scope of Work shall include, but not be limited to the following:

- Surveying (underground services survey using Ground Penetrating Radar (GPR) or other suitable geophysical techniques where GPR application has limitations for brown field development), Site grading, plot preparation, slit trenching (if necessary) & excavation (include rock cutting), backfilling including sand padding, compaction, site restoration, soil improvement, shoring (if necessary) etc. Contractor can test the excavated material to see if it can be utilized for any purpose otherwise the contractor shall dispose off site.
- Supplying all construction Materials from the Company approved source, vendors , manufacturers as applicable in line with latest AVME listing and conforming to the specifications.
- Trenching & excavation (hand, mechanical, rock breaking and rock blasting if necessary) for foundations, pipes, road crossings, pipe supports, service corridors, cables, flow lines, all type of pits, CP system, etc.
- Construction of all access roads, crossings, culverts, parking's, slope protection etc.
- Casting and installation of blinding, pipe sleepers, services markers, anchor blocks, foundations (pre-cast & in-situ) for all Equipment and structures including anchor bolts and concrete protection as per Project SPs & drawings, pipes, indicators, sign boards, all type of pits, water proofing & leak detection systems and hard stand areas, etc.
- All Civil Construction activities related to firewater system along with foundations of tanks, pumps, etc.
- All Civil Construction activities related to RCC buildings, retaining walls, drainage systems, HVAC systems etc. as per project requirement.
- Supply and install fire protection system as per project requirement.
- Fabrication and installation of structural steel, pipe supports, fasteners, temporary and permanent necessary sign boards, new fencing, handrails, ladders, gratings, stairway, gates, sunshades relevant protective coatings.
- Implementation of Inspection and Test Plan (ITP) as per project requirements
- Supply, Install, testing and Commissioning of HVAC system with all ancillary items, as per the project requirement.

Reference Documents:

The following documents should be used as reference in conjunction with the above section to realise the project as defined in the Tender Documents, for the Civil discipline:

GU-628	Civil & Building Standard Drawing
GU-629	Application and Selection of Standard Pipe Supports.
GU-631	Guideline for Sunshade – Specification – Design requirement & standard drawings.
SP-1277	Specification for Transportable Accommodation Units.
SP-1279	Specification for Civil & Building Construction.
SP-1282	Specification for Reinforced Concrete - Production & Construction Guidelines.
SP-1285	Specification for Heating, Ventilation and Air-Conditioning (HVAC).
SP-2155	Building Services Specifications.
DEP.31.76.10.10	Heating, Ventilation and Air Conditioning for Plant Buildings.

5 Mechanical Works

5.1 Piping

Contractor shall be responsible for the complete pre-construction survey, construction engineering, Material receiving, handling, transportation, storage, protection, color coding, identification, fabrication, installation, alignment of piping,testing, flushing, cleaning, drying, purging, pickling, NDT, inspection, PWHT, and bringing it to a state of mechanical and Pre-Commissioning completion in accordance with the Contract and Project approved documents. Contractor shall seek company approval for procedures/method statements of all critical site activities.

5.2 Static Equipment

Contractor shall be responsible for the complete erection, installation, and alignment of StaticEquipment (including packages) and bringing it to a state of mechanical completionin accordance with the Contract and Project approved documents. Contractor shall seek company approval for procedures/method statements of all critical site activities.

5.3 Tanks

- The Contractor shall be responsible for the construction, installation/erection and Pre-Commissioning of all Site erected storage tanks including the required supervision from Vendor.
- Contractor shall undertake the Site erection of storage tanks. The scope of Work shall include without limitation and as applicable or required by the Technical Information, preparation of tank base, erection of tank and roof sections, installation of stairs, ladders, handrails, grating, pumps, piping, gauges and instruments, earthing and cathodic protection, painting, nameplates and such like.
- Contractor shall utilise a Company Approved specialist tank fabrication and erection Vendor for the field erection of tanks, as per Company Approved vendor list.
- Contractor shall perform all testing and inspection as per Project standards and guidelines including but not limited to hydrotest, leak test and non-destructive testing. Company reserves the option to inspect storage tanks at any time during their fabrication and erection to determine that the Materials and workmanship are in accordance with the Technical Information. Contractor shall repair any deficiency detected during testing, and submit details for Company Approval, and on completion, the entire tank shall be tight and free from any deficiency or leak.

Reference Documents

The following documents should be used as reference in conjunction with this section to realise the project as defined in the Tender Documents, for Mechanical Works- Static Equipment and Tanks:

SP-1128	Specification for Cathodic Protection Design
SP -1130	Specification for Cathodic Protection Materials and Equipment

SP-1190 -1	Specification for H2S and SO2 - Management
SP-1190- 3	Specification for H2S and SO2 – Engineering Design
SP-1190- 4	Specification for H2S and SO2 – Operations
SP-2051	Specification for Pressure Testing & Sensitive Leak Testing of Piping System (ASME B31.3)
SP-2187	Specification for Storage Tanks
DEP-31.22.30.14 – Gen	Glass-fiber Reinforced Epoxy, Polyester and Vinyl Ester Vessels and Tanks
DEP-31.29.00.10 – Gen	Installation of Rotating Equipment (Amendments / Supplements to API RP 686)
DEP-31.51.01.33 – Gen	Field Erected Aboveground Vertical Storage Tanks [Amendments / Supplements to API Standard 650

5.4 Rotating Equipment

Contractor shall be responsible for the complete installation and alignment of rotating Equipment and bringing it to a state of mechanical and Pre-Commissioning completion in accordance with the Technical Information and in accordance with Vendor supplied information, procedures and good working practices. Contractor's scope of Work for rotating Equipment shall include as minimum the following:

- Checking foundation or point of support and anchor bolt dimensions and elevations prior to installation of the Equipment and advising Company of any errors or discrepancies.
- Preparation of foundations including chipping or roughening the foundation surfaces for grout adhesion purposes prior to Equipment installation.
- Lining, levelling, alignment, orientation and plumbing of Equipment in its final position.
- Preservation of all Equipment as per Company and Equipment Vendor's instructions which shall include positive blinding of all Equipment nozzles to prevent the ingress of water and foreign matter, until the issue of the Completion Certificate. Contractor shall supply all oils, grease, paint, inhibitors, sheet metal blinds and all other Materials necessary for the preventative maintenance. Contractor shall be responsible for providing and implementing a preventative maintenance schedule for all rotating Equipment.

Reference Documents:

For installation of Rotating Equipment Shell DEP 31.29.00.10-Gen and API686 are used as guideline. Generally, Vendor's Installation, Operation and Maintenance (IOM) Manuals and procedures for Rotating Equipment are followed.

SP-1252	Specification for Instrument Air Compression Package
SP-2013	High energy (≥500kW) Centrifugal Pumps
SP -2030	Low energy (≥500kW) Centrifugal Pumps
SP-2054	Specification for Centrifugal Compressor packages
SP-2149	Specification for Reciprocating Compressor packages
SP-2167	Specification for Fire Water Pumps/Packages
DEP-31.29.00.10 – Gen	Installation of Rotating Equipment (Amendments / Supplements to API 686)

5.5 Painting

Contractor shall establish a dedicated paint shop at Work Site with storage facilities within fenced areas for the safe and proper storage of paints, solvents, thinners and agents. The storage facilities shall conform strictly with the Health, Safety, Security and Environmental requirements contained within the Technical Information, Manufacturers recommendations and local government regulations.

Contractor shall instigate all necessary and required procedures and processes to ensure the safe handling, use, storage, and disposal of chemicals, including compliance with all requirements as laid down in the Contract and Technical Information, and the applicable material safety data sheets. All waste products are to be disposed of in compliance with the Contract requirements and appropriate environmental laws and regulations.

Reference Documents:

The following document should be used as reference in conjunction with this section to realise the project as defined in the Tender Documents for Painting:

SP 1246	Specification for Painting and Coating of Oil and Gas Production Facilities

5.6 Insulation

Contractor shall begin piping insulation of the line following testing and final touch up paint. Contractor shall insulate by test package as released upon completion of the testing and subsequent reinstatement.

Contractor shall establish appropriate facilities at Site such as, insulation shop, workshop, warehouse inclusive of any and all Equipment, manufacturing facilities, testing and/or storage facilities, insulation cutting Equipment, field dispensing Equipment for foam, and special vehicles necessary to perform the Work. All facilities shall be air conditioned/ventilated where required to comply with the requirements of the Technical Information and Manufacturers' recommendations/specifications.

Reference Documents:

The following documents should be used as reference in conjunction with this section to realise the project as defined in the Tender Documents for Insulation:

DEP 30.46.00.31 - Thermal Insulation

DEP 31.46.00.31 - Acoustic Insulation for Piping

6 Electrical Works

The electrical installations shall be based on providing reliable, safe power supply under all conditions including operation and maintenance activities with a minimum of power disruptions, and safety of personnel and environments. The installations shall be suitable for the environmental conditions specified in the Technical Information. Equipment installed in hazardous zones shall be compatible and approved for installation into the relevant hazardous zone classification. Contractor shall coordinate and execute the interface activities with other disciplines manage the worksite HSE as per guidelines of PDO ESR and ESOP.

The electrical scope of Work shall include as a minimum the following:

- Installation of the on-plot facilities as per the approved electrical AFC packages for high/medium/Low voltage electrical distribution system, including cabling, switchgears, 33KV GIS extension, transformers, motors, capacitor banks, earthing system, distribution boards, ENMCS system, UPS system etc. lighting system, Heat tracing system, all thefield electrical Equipment, RMS etc. and the like, and shall include any other Works which are required to be carried out for completion of the on-plot facilities electrical installations to form complete electrical systems.
- Installation of all electrical power stations including connection of the power stations to the electrical grid. Installation of all transmission lines for 33/132KV OHLs including OHLs equipment such as disconnector. The scope of work shall also include the configuration of the power stations and 132/33KV OHL to the electrical control room through Scada system.
- Installation of the off-plot facilities 33 KV overhead line, isolators, Auto re- closers, pole hole drilling, pole assembly, concrete pole erection, line stringing, road access, road crossing, cable laying, cable fixing and termination at the pole, earthing, Pre-Commissioning shall include any other Works which are required to be carried out for completion of the off-plot facilities electrical installations to form complete electrical systems. Contractor shall prepare method statements for electrical construction and Precommissioning activities and submit them to PDO approval, coordinate with operation and maintenance site teams on brown field activities. Installation of power transformer/Installation of 415V LV SWDB/installation of lighting /installation of all associated cabling for all electrical Equipment's in accordance with PDO ESR and ESOP requirement and electrical licensing requirement.
- All installation Works for Cathodic Protection systems for On-plot & Off-plot as required. Contractor shall coordinate all interface works between the electrical and other disciplines during the execution of the activities.
- All electrical Works shall be executed and tested by approved electrical contractors that are registered in the applicable Company Work category list.

- Contractor is responsible for testing and Pre-Commissioning of all electrical systems which shall be executed in accordance with relevant SPs and Manufacturer recommendations. Contractor shall coordinate with the site QAQC on the activity completion and inspection requirements.

Reference Documents:

The following documents should be used as reference in conjunction with this section to realise the project as defined in the Tender Documents for Electrical discipline:

PR-2331	Electrical safety rules
SP-1099	Specification for Electrical Installation Practice
SP-1101	Specification for installation of Overhead Transmission Lines
SP-1102B	Specification for Design of 33kV Overhead Power Lines on Concrete Poles
SP-1103	Electrical Engineering Guideline
SP-1109	Specification for Earthing and Bonding
SP-1110	Specification for Electrical Supplies for Mobile Camps
SP-1111	Specification for Temporary Electrical Supplies for Construction & Maintenance Work
SP-1107	Electrical protection system
SP-1118	Specification for Power Station
SP-1130	Specification for Cathodic Protection Materials and Equipment
SP-1114B	Specification for design of 132kV &220 KV overhead power lines on steel towers
GU-971	Guidelines for joints and termination for medium voltage cables including installation
GU-861	Electrical safety rules guideline
GU-946	Electrical safety operation guideline
GU-920	Electrical installation guideline
DEP 63.10.08.11	Field Commissioning & Maintenance of Electrical Installations & Equipment

7 Instrumentation, Control and Automation Works

Contractor shall be responsible for cable laying “Under Ground & Above Ground”, cable marking, ferruling, glanding, cables termination, cable trays fixing, junction box installation & earthing, and instrument and valve calibration, installation of all instrumentation items, all required steel Work for installation of instruments and junction boxes, interface checks, installation of all instrumentation cabinets to “FARs and control room” cabinets and systems. The Contractor shall carry out all construction works as per approved drawings & Technical Specifications.

Contractor is responsible for cabling and termination of cables to the interface point of Other Contractor and vendor supplied packages. This interface point may either be a junction box at the boundary of the supplied package, or to an instrument mounted onto a skid or piece of Equipment or a control system.

In addition, Contractor shall be responsible for the following in accordance with the Technical Information:

- Erection and interconnection of control panels, cubicle boards, control desks, wall mounted panels, LED screens etc. locally and in the control rooms.
- Calibration, loop checking, testing, and functional checking of all the instruments and accessories.
- Arrangement and supply of testing Equipment’s and other instruments such as dead weight testers, manometers, portable pneumatic / electronic calibrators, standard test gauges, thermocouple test kits, D.C potentiometers, Wheatstone bridges, decade resistance box, temperature baths with thermostatic control, oscilloscope, signal generator, meggers, vacuum pump, hydraulic pump, a voltmeter, digital multi-meters, HART communicators, field-bus test Equipment, vibration calibration tools for calibration of accelerometers, velocity and displacement sensors, tag name marker etc.
- The Contractor shall provide a fit for purpose instrument workshop/Lab at Site with the necessary testing and calibration devices which shall be certified with an accredited third party.
- When Contractor finds any discrepancies between drawings & documents and the feasibility of execution, contractor shall inform the Company immediately.
- Contractor shall be responsible for the receiving, inspection, storage and handling of all instruments materials and equipment whether supplied as free issue by Company and/or procured by Contractor, in a clean organized and segregated storage area which ensures that temperature and other climatic condition will not affect the material and equipment.
- Supply, fabrication, and installation of frames, field instruments sunshades, protective boxes, supports, mounting stands, clamps, brackets, cable racks, cable

trays and bends, tees and crossings etc.

- Fabrication, laying and supporting of impulse tubing, piping, sample lines and fittings.
- Pressurize testing and Hydro testing of main air header and distribution lines, pneumatic and hydraulic tubing, impulse lines etc. for any leakage and proper connections.
- Contractor shall maintain red line mark-up of the different drawings to reflect the as-built status and submit the same to Company.
- Fiber optic cables laying as per approved drawings.
- Installation of Explosion proof devices and installation as per drawings and documents.

Reference Documents:

The following documents should be used as reference in conjunction with this section to realise the project as defined in the Tender Documents for Instrumentation and Control Automation discipline:

SP-1206 C & A Standard Drawings

DEP 32.31.00.32 Instrument for Measurement and Control

DEP 32.31.00.34 Instrumentation Documents and Drawings

DEP 32.37.10.11 Installation of On-Line Instruments

DEP 32.37.20.10 Instrument Signal Lines

DEP 62.10.08.11 Inspection & Functional Testing of Instruments

Appendix A - User Feedback Page

	**SP-2050 – SPECIFICATION FOR CONSTRUCTION ACTIVITIES ON OIL, GAS AND UTILITY FACILITIES PROJECTS USER FEEDBACK FORM**		
	Any user who identifies an inaccuracy, error or ambiguity is requested to notify the custodian so that appropriate action can be taken. The user is requested to return this page fully completed, indicating precisely the amendment(s) recommended.		
Name:			
Ref ID		**Date:**	
Page Ref:	**Brief Description of Change Required and Reasons**		

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	Custodian of Document	**Date:**	