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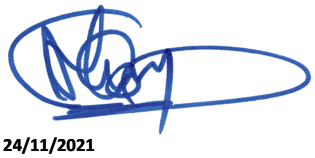
ADNOC

ADNOC GROUP PROJECTS & ENGINEERING

CONTRACTORS QAQC REQUIREMENT

Specification

APPROVED BY:



24/11/2021

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EFFECTIVE DATE:

AGES-GL-13-001

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شركة بترول أبوظبي الوطنية
Abu Dhabi National Oil Company

GROUP PROJECTS & ENGINEERING FUNCTION/ PT&CS DIRECTORATE

CUSTODIAN	Group Projects & Engineering / PT&CS
DISTRIBUTION	Specification applicable to ADNOC&ADNOC Group Companies

REVISION HISTORY

DATE	REV. NO	PREPARED BY (Designation/ Initial)	REVIEWED BY (Designation/ Initial)	ENDORSED BY (Designation / Initial)	ENDORSED BY (Designation / Initial)
9 Sep 2021	1	Ayman Helmy/Sr. QA/QC Eng. Digitally signed by Ayman Helmy Date: 2021.10.10 11:03:43 +04'00' Rajkumar Betala/ Sr. QA/QC Eng. Rajkumar B 2021.10.10 11:15:33 +04'00'	Hussain Al Harthi/ HOD QA/QC - GPE Digitally signed by Hussain A. AlHarthi Date: 2021.10.10 14:42:22 +04'00'	Najem Qambar / VP Group Eng. - GPE Najem A. Qambar 2021.10.12 11:01:15 +04'00'	Ebraheem AlRomaithi / SVP-GPE 23/11/2021

The Group Projects & Engineering Function is the owner of this Specification and responsible for its custody, maintenance, and periodic update.

In addition, Group Projects & Engineering Function is responsible for communication and distribution of any changes to this specification and its version control.

This document will be reviewed and updated in case of any changes affecting the activities described in this document.

INTER-RELATIONSHIPS AND STAKEHOLDERS

a. The following are inter-relationships for implementation of this Specification:

   i. ADNOC Upstream and ADNOC Downstream Industry, Marketing & Trading Directorate

   ii. ADNOC Onshore, ADNOC Offshore, ADNOC Sour Gas, ADNOG Gas Processing. ADNOC LNG, ADNOC Refining, ADNOC Fertilisers, Borouge, Al Dhafra Petroleum, Al Yasat.

b. The following are stakeholders for the purpose of this Specification:

   iii. ADNOC PT&CS Directorate

c. This Specification has been approved by the ADNOC PT&CS is to be implemented by each ADNOC Group COMPANY included above subject to and in accordance with their Delegation of Authority and other governance-related processes in order to ensure compliance.

d. Each ADNOC Group COMPANY must establish/nominate a Technical Authority responsible for compliance with this Specification.

DEFINITIONS

'ADNOC' means Abu Dhabi National Oil COMPANY.

'ADNOC Group' means ADNOC together with each COMPANY in which ADNOC, directly or indirectly, controls fifty percent (50%) or more of the share capital.

'Approving Authority' means the decision-making body or employee with the required authority to approve Policies and Procedures or any changes to it.

'Business Line Directorates' or **'BLD'** means a directorate of ADNOC which is responsible for one or more Group Companies reporting to, or operating within the same line of business as, such directorate.

'Business Support Directorates and Functions' or **'Non- BLD'** means all the ADNOC functions and the remaining directorates, which are not ADNOC Business Line Directorates.

'CEO' means chief executive officer.

'COMPANY' means 'Abu Dhabi National Oil COMPANY or any of its group companies. It may also include an agent or consultant authorized to act for, and on behalf of the COMPANY'.

'CONTRACTOR' means the party, which carries out the project management, design, engineering, procurement, construction, commissioning for ADNOC projects.

'Group COMPANY' means any COMPANY within the ADNOC Group other than ADNOC.

'SHALL' indicates mandatory requirements

'[PSR]' indicates a mandatory Process Safety Requirement

'Standard' means normative references listed in this specification.

CONTROLLED INTRANET COPY

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1. GENERAL

1.1 PURPOSE

The objective of this specification is to specify the minimum Quality Assurance and Quality Control requirements which shall be adopted for use by CONTRACTORs, Consultants, Sub-Contractor's, Vendors, Suppliers and Manufacturers performing work in all ADNOC Projects in order to provide assurance that work contracted by ADNOC meets the required level for quality.

1.2 SCOPE

This Specification is intended to specify the minimum basic ADNOC Requirements for CONTRACTORs Quality System and shall not relieve the CONTRACTOR of any contractual obligations. Any deviation from this specification shall be identified by CONTRACTOR and shall require a written approval from COMPANY.

This document is mandatory and applicable for implementation in the project execution phase onwards from the Invitation to Tender (ITT), FEED, Detailed Engineering, Procurements, and Site Construction, until Pre-Commissioning.

This document will constitute a major part in ADNOC Group Projects & Engineering CONTRACTORs Scope of Work (SOW) and subsequently to their subordinates (Sub-Contractor's & Vendors) henceforth. This guideline is intended for use during the define and execution stage of the asset life cycle.

In this specification, the term CONTRACTOR includes all Sub-Contractor's, suppliers, vendors, consultant's, or any entity who is responsible for delivering some or all parts of the contract scope of work.

1.3 OBJECTIVE

The objective of this document is to guide ADNOC Group Companies CONTRACTORs towards establishment of a Project Quality Plan (PQP) in accordance with ISO 9001 & ISO 10005 (Quality Management Systems – Guidelines for Quality Plan) in order to provide assurance that the project meets the required level of quality.

1.4 COVERAGE

This Guideline covers PQP requirements applicable to all CONTRACTORs, Sub-Contractor's, Manufacturer, Suppliers, Vendors, Sub-vendor, TPIA, Consultants or any entity that will be engaged by CONTRACTOR and are responsible for delivering some or all parts of contract scope of work for ADNOC.

1.5 DEFINED TERMS / ABBREVIATIONS

ADNOC	Abu Dhabi National Oil Company
AH	Asset Holder
ALARP	As Low As Reasonably Practicable
AO	Asset Owner
ASNT	American Society for Non-Destructive Testing.
AUT	Automatic Ultrasonic Testing.
AVL	Approved Vendors List
CAPA	Corrective Action Preventive Action
CAR	Corrective action request
COC	Certificate of Conformity
CPMT	CONTRACTOR's Project Management Team
CSWIP	Certification Scheme For Welding Inspection Personnel
DFO	Documentation for Operation
EDMS	Electronic Document Management System
EPC	Engineering, Procurement And Construction.
FAC	Final Acceptance Certificate
FAT	Factory Acceptance Test.
FEED	Front End Engineering Design
HAZID	Hazards Identification
HAZOP	Hazards and Operability
HSE	Health, Safety & Environment
HSEIA	Health, Safety and Environmental Impact Assessment
IA	Integrity Authority
IVB	Independent Verification Body
ICP	Independent competent person
IDC	Interdisciplinary Checking.

IM	Integrity Management
IRN /IRC	Inspection Release Note / Inspection Release Certificate
ISO	International Organisation for Standardization
ITB	Invitation to Bid
ITP	Inspection &Test Plan
ITT	Invitation to Tender
KPIs	Key Performance Indicators
MOC	Management of Change
MRB	Material Record Book
MTC	Material Test Certificate
NCR	Non Conformance Report
NDT	Non Destructive Testing
P&ID	Process & Instrumentation Diagram
PAC	Provisional Acceptance Certificate
PAUT	Phased Array Ultrasonic Testing.
PCN	Personnel Certification In Non-Destructive Testing As Per BS EN ISO 9712 Requirements.
PEP	Project Execution Plan issue by CONTRACTOR
PHSER	Project Health, Safety And Environmental Review.
PIM	Pre-Inspection Meeting
PMI	Positive Material Identification
PMT	Project Management Team
PO	Purchased Order
PQD	Projects Quality Department
PQMS	Project Quality Management System
PQP	Project Quality Plan
PQSR	Projects Quality System Requirements
QA	Quality Assurance

QC	Quality control
QM	Quality Manger
QMS	Quality Management System
QPR	Quarterly Performance Review
QRA	Quantitative Risk Assessment
RFI	Request for Inspection
SAT	Site Acceptance Test
SOW	Scope of Work
TA	Technical Authority
TBE	Technical Bid Evaluation
TD	Technical Deviation.
TOFD	Time of Flight Diffraction (Ultrasonic Testing)
TOR	Terms of Reference
TPIA	Third Party Inspection Agency
TPI	Third Party Inspection

2. REFERENCE DOCUMENTS

2.1 INTERNATIONAL CODES AND STANDARDS

The following Codes and Standards shall form a part of this specification. When an edition date is not indicated for a Code or Standard, the latest edition in force at the time of the contract award shall apply.

INTERNATIONAL ORGANISATION FOR STANDARDISATION (ISO)

ISO 9001 : Quality Management Systems –Requirements

ISO 9004 : Managing for the Sustained Success of an Organization –A Quality Management Approach.

ISO 10005 : Quality Management - Guidelines for quality plans

ISO 19011 : Guidelines for Auditing Management Systems

ISO 29011 : Petroleum, petrochemical, and natural gas industries-Sector-specific quality Management systems - Requirements for product and service supply Organizations

API Q1 :Specification for Quality Management System Requirements for Manufacturing Organizations for the Petroleum and Natural Gas Industry

API Q2 :Specification for Quality Management System Requirements for Service Supply Organizations for the Petroleum and Natural Gas Industries

ISO 45001 : Occupational health and safety management systems - Requirements with guidance for use

ISO 14001 : Environmental management systems -Requirements with guidance for use

ISO 17025 : General requirements for the competence of testing and calibration Laboratories

2.2 ADNOC SPECIFICATIONS

AGES-SP-13-001 : Criticality Rating Specification

AGES-GL-13-002 : Positive Material Identification of Equipment and Piping

AGES-SP-13-002 : Project Procurement and certification requirements.

AGES-SP-13-003 : Traceability of Shop & Field Piping Materials

3. DOCUMENT PRECEDENCE

The specifications and codes referred in this document SHALL, unless stated otherwise, be the latest approved issue at the time of CONTACT award.

It SHALL be the CONTRACTOR's responsibility to be, or to become, knowledgeable of the requirements of the referenced Codes and Standards.

The CONTRACTOR SHALL notify the COMPANY of any apparent conflict between this specification, the related data sheets, the Codes and Standards and any other specifications noted herein.

Resolution and/or interpretation precedence SHALL be obtained from the COMPANY in writing before proceeding with the design/manufacture.

In case of conflict, the order of document precedence SHALL be:

- UAE Statutory Legislation requirements
- ADNOC Standards, regulations and Codes of Practice
- Equipment datasheets and drawings
- Project Specifications and standard drawings
- National/International Standards

4. QUALITY MANAGEMENT SYSTEM REQUIREMENTS

CONTRACTOR shall own a Quality Management Systems in compliance with ISO 9001:2015 and API Specification Q1 (Specification for Quality Management System Requirements for Manufacturing Organizations for the Petroleum and Natural Gas Industry) or API Q2(Specification for Quality

Management System Requirements for Service Supply Organizations for the Petroleum and Natural Gas Industries) as applicable.

ISO 29001 (Petroleum, petrochemical, and natural gas industries —Sector-specific quality management systems —Requirements for product and service supply organizations).

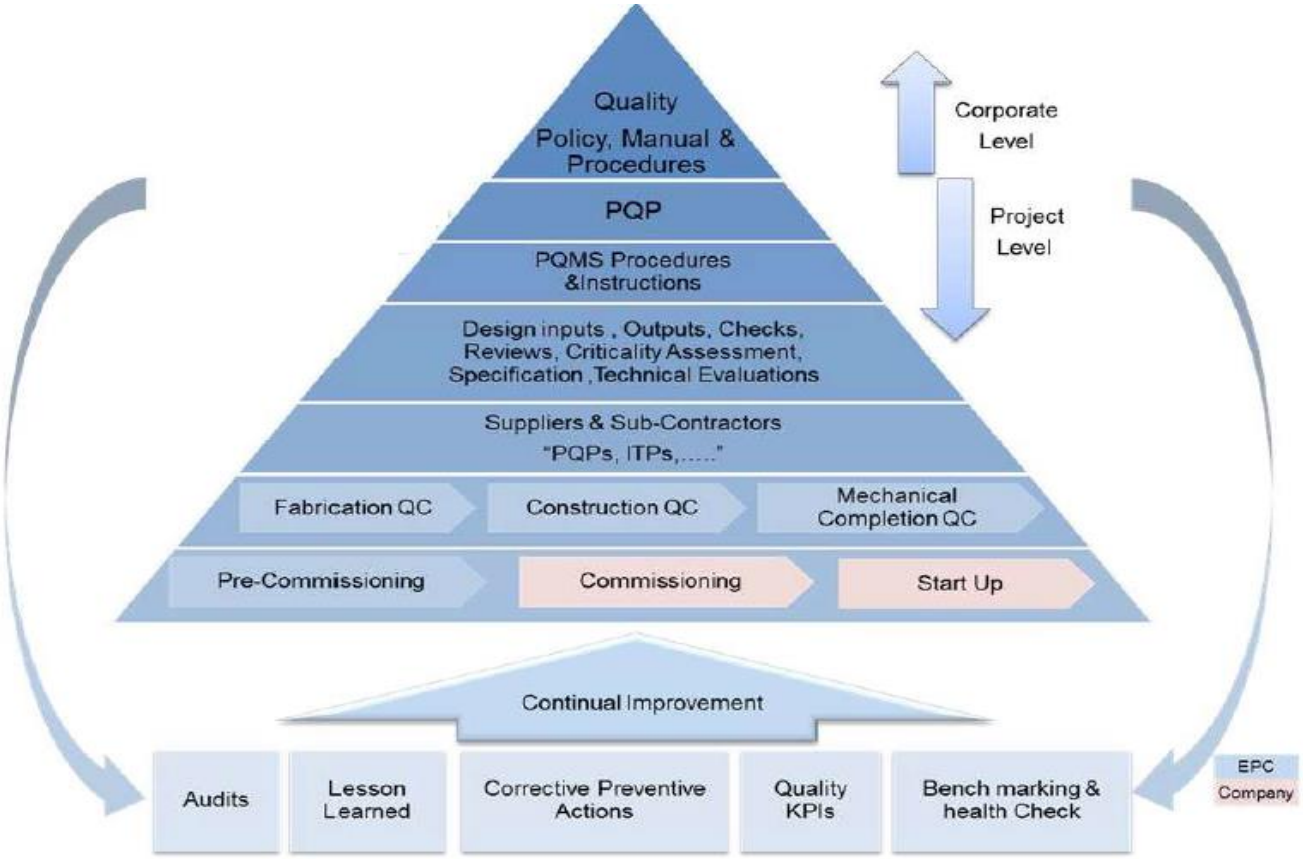
The CONTRACTOR shall adopt a Process Approach while developing, implementing, and improving the QMS, considering COMPANY AGES-GL-13-001 (This Document) and the latest edition of International Standard.

The QMS structure shall consist of quality planning, control, assurance, and continuous improvement processes in addition implementing the concept of risk-based thinking Addressing both risks and opportunities for increasing the effectiveness of the quality management system, achieving improved results and preventing negative effects.

CONTRACTOR shall apply the Deming PDCA cycle-see Figure (1) to all project processes and to the QMS with an overall focus on risk-based thinking.

(Figure - 1) Deming's PDCA cycle

CONTRACTOR shall have a documented Quality management system in the form of a Quality Manual, Quality Policy, Procedures, Work Instructions, Check sheet and Forms as shown in Figure (2).



(Figure - 2) CONTRACTOR PQMS Structure

5. QUALITY PLAN

The Project Quality Plan shall be in accordance with the latest elements of ISO 9000 series applicable to the Contract and this document, which shall include, but not limited to the following:

- Corporate Quality and project quality Organization chart.
- Interface responsibilities.
- Planning.
- Design control.
- Design verification.
- Design validation.
- Inter Disciplinary check
- Procurement Control.
- Control of Vendors.
- Manufacturing control.
- Construction control.
- Quality records and documentation system.
- Project construction certification system covering progress and Quality milestones and deliverables.
- Control of performance and performance matrices (Internal & External KPIs).
- List of approved Suppliers and Vendors to be used for the Project.
- List of special services and their providers.
- List of approved Sub-Contractor's.

- Others.

CONTRACTOR Project Quality Plan shall be in line with the requirements of **Appendix (A)** of this standard. The CONTRACTOR may prepare separate detailed PQPs covering phase of the Project execution (e.g., Engineering, Procurement & Construction) in addition to the mandatory holistic general PQP of the Project in total, if deemed necessary by COMPANY.

6. KEY PERFORMANCE INDICATORS (KPI) AND PROCESS MEASUREMENT.

CONTRACTOR shall establish KPI (Key Performance Indicators) for project scope to measure the quality performance. The KPI shall be established to cover all discipline activities & covering all process (Engineering, Procurement, Construction, and Pre-commissioning)

COMPANY provided KPI guidelines that shall be followed as a minimum and as applicable to the scope of work refer to **Appendix (I)** of this standard.

KPI shall be reported on weekly and monthly basis to COMPANY. Trend analysis shall be submitted to COMPANY for KPIs which beyond the targets along with its analysis. The analysis should be reported as area of concern in the reports.

The quality analysis shall be conducted based on inspection results, site observations, NCR, KPI results and audit/performance reports.

A system for tracking and reporting the status and performance of the inspection and testing activities should be established and implemented. Records of all tests and inspections shall be maintained and should contain the necessary signatures of endorsement and acceptance where required.

KPI indicators weightage shall be assigned covering all activities and all processes of the involved departments.

7. QA/QC ORGANIZATION

The CONTRACTOR Quality organization shall be fully independent and reporting directly to CONTRACTOR's senior management and having the necessary authority for ensuring that the Project Quality requirements are implemented and maintained.

CONTRACTOR’s production & construction management shall have no influence on quality organization in any form or under any conditions.

The Project Quality organization shall be independent from the CONTRACTOR corporate organization and could be supported in certain cases by the corporate organization with prior approval from COMPANY.

COMPANY has the authority to interview the CONTRACTOR / Sub-Contractor’s proposed QA/QC candidates and may disqualify any individual or agency on technical grounds or unsatisfactory performance.

CONTRACTOR / Sub-Contractor’s QA / QC, vendors QAQC &Project personnel qualification and certification requirements shall meet the requirements of **Appendix (J)** of this standard, and the numbers of QA/QC personnel of each discipline. In addition, the pre-selected candidates will be subject to assessment and face-to-face interviews by COMPANY as well as on-job probation period before final approval.

8. PERSONNEL COMPETENCE, TRAINING AND AWARENESS

Contractor shall submit a training matrix for discipline and personnel involved in the project activities. The matrix shall include the name of personnel, discipline tentative week for training and core competencies or area identified for training. Update the matrix every 3 months.

Contractor shall maintain all the records related to personnel qualification, training and competency and made available for COMPANY review and audit.

CONTRACTOR shall follow the requirements of **Appendix (E)** of this standard.

9. MANAGEMENT REVIEW

CONTRACTOR's senior management shall review the Project specific Quality system on a regular In accordance with ISO 9001:2015 requirements to ensure that the system is suitable and effective.

CONTRACTOR shall report the results and recommended actions of such reviews to the COMPANY Representative during the monthly progress review meeting. Changes to the Quality system that result from CONTRACTOR's senior management reviews shall be incorporated in the Project Quality plans with the approval of the COMPANY representative.

10. QUALITY AUDITS

10.1 INTERNAL AUDITS

As a minimum CONTRACTOR shall conduct the internal audits at 30%, 60%, and 90% of each location/phase/discipline for its Engineering, Procurement, and Construction work. CONTRACTOR shall submit its detailed audit schedule and checklists to COMPANY including audits of Sub-Contractor's / Vendors. Any rescheduling of the audits can be done only with formal approval of the COMPANY representative. Follow up audits shall be conducted at regular intervals on key areas in accordance with the CONTRACTOR audit program duly approved by the COMPANY.

The internal auditor shall have enough experience in auditing and certified by an international auditors certification authority (e.g. IRCA or Equivalent). Internal Audit program shall include (but not limited to) mechanical completion audit, Film digitization audit and completeness of hand over of document audit. Periodic audit of the VENDOR / SUB-CONTRACTOR as per the EPC Contract requirements will be carried out and reported to COMPANY.

10.2 EXTERNAL AUDITS

10.2.1 Post Mobilization Audit

COMPANY shall conduct a post mobilization quality audit after (1-3 months) from the contract award date in order to ensure contractor's readiness in terms of resources and team mobilization and to highlight any short falls at early stage of the project.

10.2.2 Interim Quality Audits

In order to have confidence in the performance of CONTRACTOR's Quality System, COMPANY shall conduct quality system compliance audit on the EPC phases for Engineering, Procurement, and Construction activities at least 2 times as minimum at 30-40% and 60-70% of project progress.

COMPANY also May conduct a follow up external audit after mechanical completion (after pre-commissioning but before commissioning) to ensure all the findings of the previous audits are closed before commissioning and handover to operation.

10.2.3 Unplanned/ Ad-Hoc Quality Audits

COMPANY may also perform unplanned Quality and Technical compliance audits or Focused Assessment on critical functions and current negative trends of performance for reported disciplines or processes on the CONTRACTOR and Sub-CONTRACTOR works. CONTRACTOR shall provide assistance and access to their systems and VENDOR /SUB-Contractor systems as required.

CONTRACTOR should initiate corrective actions for the findings identified in each audit. CONTRACTOR shall verify implementation of corrective actions prior to the next scheduled audit and inform COMPANY accordingly.

CONTRACTOR to ensure and shall submit to the COMPANY Representative a copy of each audit report and the close out plan for all findings irrespective of the category they are classified as per the CONTRACTOR non-conformance management system within 14 calendar days of its completion.

The COMPANY Representative or its nominee shall be invited to participate in all audits and reviews. Audit and review notifications along with checklist shall be submitted to the COMPANY Representative fourteen calendar days in advance.

Contractor Project Quality Manager shall be responsible for all Quality audits from FEED, Engineering, EPC Phase of the Project.

CONTRACTOR shall maintain a matrix of all CAPAs', Observations identified during the above stated Audit programs. CONTRACTOR shall monitor closure and submit to COMPANY the updated matrix on a Monthly basis.

11. PRE-CONTRACT AWARD REQUIREMENTS

During the technical bid evaluation stage and pre-contract award, CONTRACTOR shall provide in his bid a "Quality assurance execution statement" that explains in detail how he will implement the Quality assurance requirements in all phases of the Contract scope.

The following documentation shall be submitted by the bidder along with the QA execution statement:

- Quality Management System Certificates of compliance with ISO 9000 provided by accredited independent body covering the intended SOW and the specific locations of the CONTRACTOR / Consultant that are going to be utilized during the execution of all the project works.
- The list of general management procedures applicable to the contract with outline of objective and filed application.
- Project documentation and records control procedure.
- Internal audit procedure with the list of qualified auditors.
- Corporate Quality Organization.
- Audit schedule for previous 36 months (three years) showing planned and completed audits.
- Quality Audit report from past projects duly signed by Client.

- Statistic report for audits (External / Internal) findings for previous three years.
- FEED verification and endorsement report.
- Preliminary project Quality Plan specific to the Project and demonstrating CONTRACTOR understanding of all Project particularities and shall satisfy the following:
- Compliance to Project SOW.
- Contract Quality records control procedure detailed and dedicated to the Project.
- Detailed proposed Inspection Agencies intended to be used by Contactor for Quality Control or surveillance approved by COMPANY.
- Include Quality organization chart compliant with Section 7 and **Appendix (J)** of this standard for each phase of the Contract and details interfaces with Tenderer's corporate Quality organization. Include resumes of Quality personnel assigned to the Project at each phase of the Contract.
- Refer **Appendix (C)** for sample of quality documents and their categorization, CONTRACTOR shall prepare a comprehensive quality document list related to the project and send for COMPANY approval.

12. POST CONTRACT AWARD / PLANNING STAGE

CONTRACTOR shall prepare a Project Quality policy and Project Quality objectives with Key Performance Indicators (KPIs). Project KPIs shall be prepared as per criteria of **Appendix (I)** of this standard.

The Project kick-off meeting shall be held at the first instance after Contract award to Contractor. The objective of the meeting is to clarify and confirm the CONTRACTOR understanding of the requirements to ensure total compliance with applicable specifications and Project requirements. Within one month of Contract award, CONTRACTOR shall submit to COMPANY a holistic, detailed, and dedicated Project Quality Plan, which describes the specific practices, procedures and resources, which shall be implemented for all Project activities and phases.

Appendix (A) of this standard gives the "least contents" for any "Project Quality Plan" which shall be in line with "Project Scope of Work" and "Project Execution Plan".

A schedule for development of applicable procedures can be supplied progressively (as applicable) where the work scope requirements dictates. Refer **Appendix (C)** for sample of quality documents and their categorization, CONTRACTOR shall prepare a comprehensive quality document list related to the project and send for COMPANY approval.

13. DETAILED ENGINEERING QUALITY REQUIREMENTS

During the design stage and subsequent Project phases, CONTRACTOR shall initiate appropriate procedural controls over the following activities sequences as indicated by the detailed engineering process flow chart shown in figure - 3.

As a minimum CONTRACTOR shall establish the following design procedural controls:

- Design Control Procedure.
- Design Change Control Procedure.
- Technical Queries Procedure.
- Inter Discipline checking Procedure.
- Design Review Procedure.

- Design Verification Procedure.
- Design Validation Procedure.
- Management of Change Procedure.
- Software and Spreadsheet Control and Validation Procedure.
- Design Assurance reviews plan and procedures (HAZOP, QRA, PHSER, Constructability, Maintainability, Operability…etc.) as applicable.
- Identification of long lead items,
- Feasibility, conceptual and detailed engineering studies as required,
- Planning of the work scope at Level 1-4 as appropriate,
- Work breakdown structure (WBS) as required,
- Use of units and symbols,
- Interface management amongst stakeholders including Company, Subcontractors, Vendors, TPIA and IVB; etc.
- Discipline and inter-discipline check,
- Design reviews and verifications, including interim validation reports to Company, if required,
- Use of computer software and hardware product licenses, as applicable,
- Basis of design documentation,
- Calculations and alternative calculations, and validations,
- Technical library including specifications, standards, codes, Vendor data etc.
- Technical appraisal and change management and control,
- Production of specifications including amendments,
- Production of drawings and material take-offs (MTO's) including revisions,
- Safe Operations assessments (SAFOPS),
- Operability assessment including 3D multidiscipline model reviews,
- Constructability assessment,
- Maintainability and Life Cycle Cost assessment,
- Spare's philosophy including preparation of operation/maintenance manuals,
- Equipment criticality rating assessment with documentation/calculations,
- Compilation of Manufacturer Data Books (including asset registration and data sheets) and as Built Record; etc.
- Identification of project documentation for quality records,
- The unique characteristics of individual plant item and their specific requirements,
- Packaging, handling, storage, and preservation maintenance per equipment,
- Communications and document control,
- Production of technical and commercial reports,

The above list is not exhaustive, and any other activity deemed necessary by Contractor or Company shall be included for appropriate procedural.

CONTRACTOR shall perform all design and engineering services in accordance with the Project Engineering Procedures and the requirements of project SOW, appropriate National, International and industry codes and standards, good engineering, and construction practices, etc., as required to produce a design that is inherently safe, demonstrates design integrity, and meets performance requirements specified in the Contract.

CONTRACTOR shall develop engineering design in sufficient detail required to support all phases of the PROJECT, including Detailed Engineering, Procurement, Construction, Pre-Commissioning and Commissioning assistance phases of the PROJECT.

All calculations, documents, drawings, etc., required for design, operations, maintenance, procurement, etc., shall be produced in accordance with specified requirements and shall be formatted, catalogued in accordance with the requirements specified for Operating and Maintenance manuals, Engineering Dossiers, Drawings, etc. and as referenced in the contract Scope of Work.

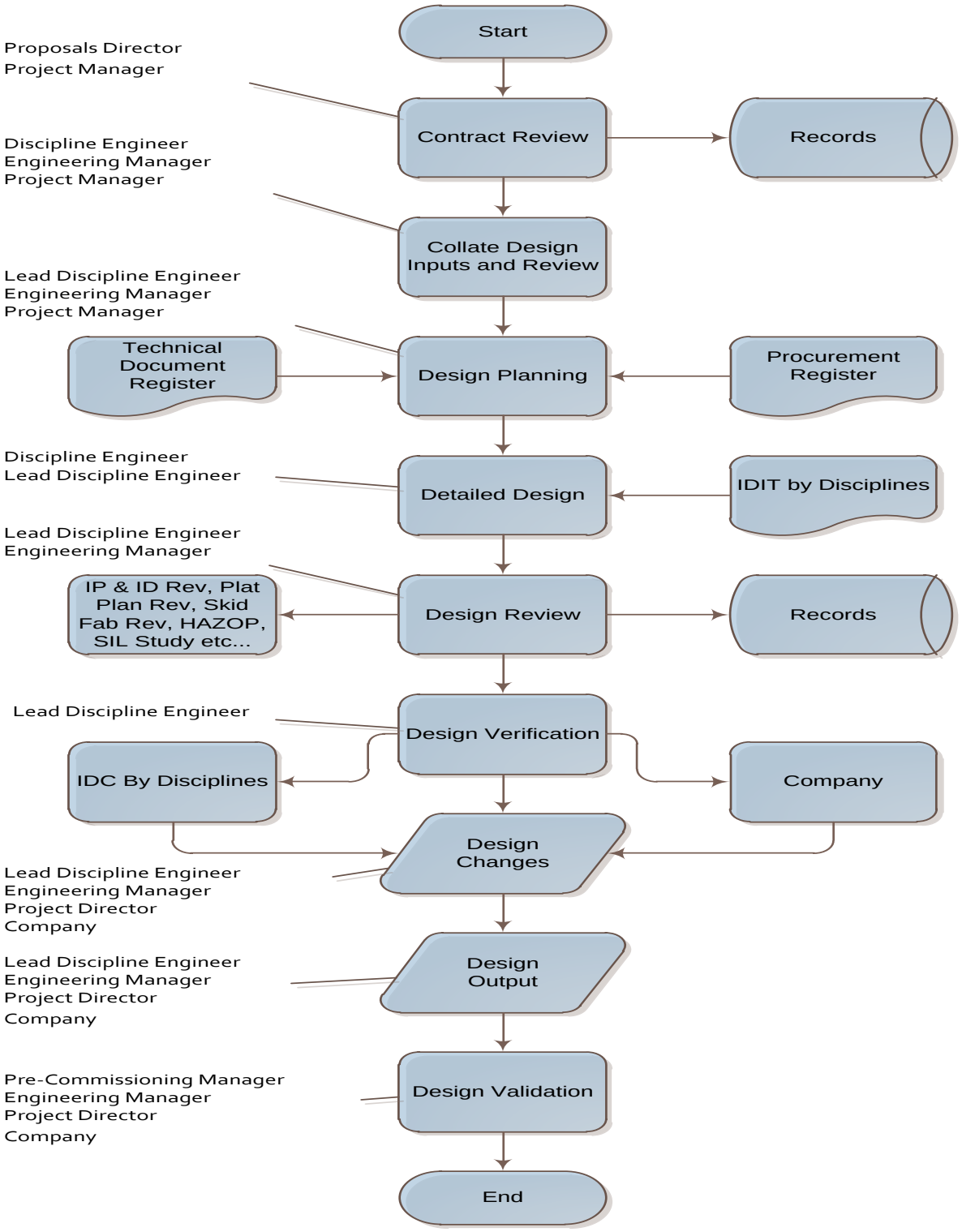
CONTRACTOR shall perform all studies, design calculations, etc., and produce detailed design documents, drawings, specifications, etc. All calculations shall be performed using Industry proven and internationally accredited software, mathematical, formula, relationships, equations / procedures and international codes and standards.

All calculations (including those produced by SUPPLIERs and SUB CONTRACTORs) shall be documented and checked by CONTRACTOR and endorsed prior to seeking COMPANY review and approval.

CONTRACTOR shall be responsible for producing all detailed drawings for construction including plans, details, fabrication drawings, etc.

Sequence of submission during review periods shall be established to avoid multiple submissions and finish the review within stipulated schedule.

During the design stage, CONTRACTOR shall provide a criticality level to each plant item included in the design scope of work. This level shall be directly related to the required inspection and certification levels for each applicable plant item. Based on the criticality level the inspection and test plans and the involvement of the Third Parties inspection / certification shall be established by Manufacturer and CONTRACTOR for each item. Refer to AGES-SP-13-001 (Criticality Rating Specification) and AGES-SP-13-002 (Project Procurement and certification requirements).



(Figure - 3) Detailed Engineering Process Flow Chart

14. PROCURMENT QUALITY REQUIRMENTS

14.1 GENERAL

CONTRACTOR is responsible for ensuring that all supplies and services are resourced from Vendors, Suppliers, and SUB-CONTRACTORs listed in COMPANY approved Vendor's list (AVL) as enclosed in the Contract documents.

CONTRACTOR shall be responsible for the procurement of all equipment and material for the completion of the Project Works in accordance with contractual procurement scope of work, including, Pre-Commissioning, and commissioning spare parts.

New materials shall be ordered, specified, designed, and manufactured for COMPANY in specific as per the applicable technical norms and Quality requirements.

Ex-stock, surplus or leftover materials are NOT permitted to be used in COMPANY Projects under any conditions, unless approved by COMPANY for special circumstances based on a strong justification from the CONTRACTOR. CONTRACTOR shall raise a written request for the COMPANY approval indicating the specific items required with limited quantities along with their technical description and requesting to procure from stockiest and fulfilling the requirements as per **Appendix (F).**

CONTRACTOR shall procure all consumables and other materials required to execute the Project, including materials used for fit-ups, transportation, temporary supports …etc. in full compliance to the applicable requirements.

For materials requiring certificates type 3.2 according to EN 10204, the CONTRACTOR shall ensure that all 3.2 certificates issued by the Manufacturer and endorsed by a recognised international TPI organization within the COMPANY Approved Vendors List, certification body (TPI) is independent and not representing Vendor or CONTRACTOR.

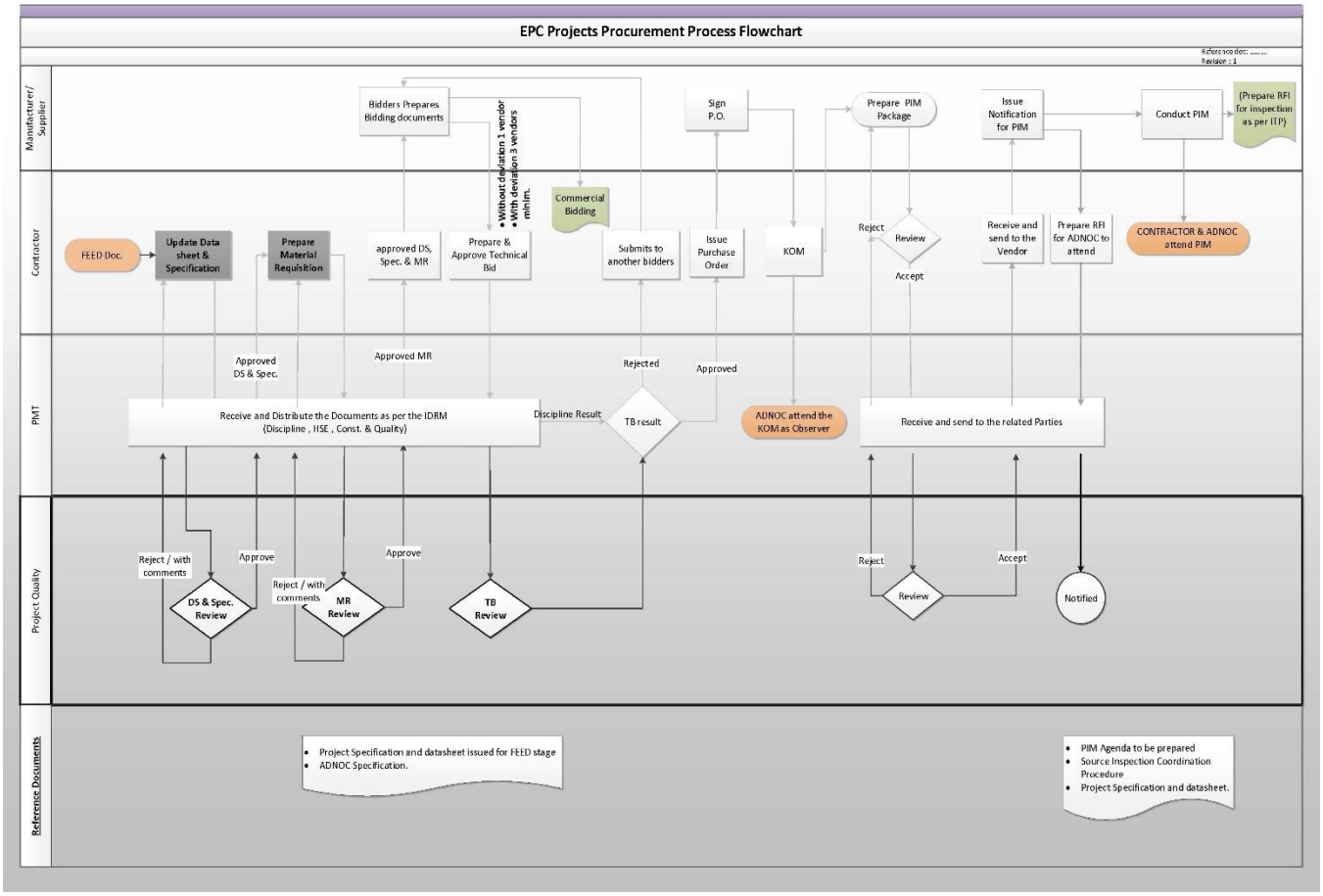
CONTRACTOR's Quality system shall ensure the following, as a minimum, during procurement:

- Purchase orders contain all the applicable, approved, accurate, complete technical data, test, inspection, and documentation requirements.
- A formal system operates for verification and acceptance activities (e.g., audit, inspection, surveillance …etc.) shall be established and to be performed by suitably qualified personnel at appropriate stages by CONTRACTOR in order to ensure conformance to specified requirements.
- Non-conformance and changes from the specified requirements are detected and reported to the CONTRACTOR's concerned authority then shall be escalated to COMPANY by relevant Quality documents such as Non-Conformity Report (NCR) and /or Technical Deviation (TD) respectively as deemed applicable.
- Purchase orders terms and conditions shall contain the following statement "No technical deviation shall be accepted post award".

14.2 PROCUREMENT PLANNING AND PROCESS

- Planning for procurement activities, shall be done for the overall Project schedule, particularly to ensure the availability of materials required and critical material / equipment, which may affect the Project schedule.
- CONTRACTOR shall prepare procurement plan, which will include the planned and actual dates at least and not limited to the following:

➢ Inquiry
➢ Purchase Order
➢ Expected Time of Delivery (ETD)
➢ Expected Time of Arrival at site (ETA)
➢ Production Schedules and Status Reports
➢ Prior to the initiation of the work, the supplier/CONTRACTOR shall produce and submit to COMPANY a realistic production schedule.
➢ Throughout the duration of the work, the Manufacturer / Vendor shall prepare and submit weekly status reports and schedule updates.
➢ KPI shall be developed by vendor and is submitted for COMPANY approval & its progress is submitted in the weekly reports to COMPANY.



(Figure - 4) Contractor Procurement Process Flow Chart

14.3 PROCUREMENT REQUISITIONING

Material requisitions shall be prepared by the CONTRACTOR's Design and Engineering department and shall consider the following:

- TBE shall be a logic gate for preparation of material requisition.
- Basic design data.
- Applicable Codes, Standards, Specifications, and other special Project requirements.
- Materials of constructions to be used, including clearly specified requirements on material testing, certification, and acceptance criteria,
- Inspection and testing activities to be carried out detailing scope, extent, interventions, and acceptance criteria as indicated in the "Inspection and Test Plan" for part(s) and / or equipment.
- The unique characteristics of individual plant item and their specific requirements concerning packaging, preservation, storage, and handling.
- Data and drawing requirements for Sub-CONTRACTORs including the requirements for the content and compilation of manufacturing reports.
- Manufacturer's Record Book (MRB) Index shall be submitted for COMPANY Approval, & is in line with project Documentation, content is required for any sourced manufacturing item.
- Provision of COMPANY and CONTRACTOR is right of access to vendors' facility and work-related documents for inspection and audit.

14.4 VENDORS / SUPPLIERS SELECTION

- CONTRACTOR shall place orders and sub-orders only with Suppliers & Manufacturers included in the COMPANY Approved Vendors List (AVL) for procurement and manufacture of all equipment, parts, and materials including bulk and all special materials.
- Any Vendor / Supplier shall possess a valid ISO accreditation (ISO 9001, 14001, 18001, & 17025 "for laboratories") and technical accreditation from SHELL, ASME, API …etc. according to the specific purchase order and applied specifications requirements.
- CONTRACTOR shall assess / audit Vendor / Supplier or Sub-CONTRACTOR's Quality system and technical capabilities to ensure that it is suitable and satisfies the requirement for the procured supply or service before production commencement, as the reliance solely on vendor's certification to ISO quality system or being listed in COMPANY AVL is not a secured approach.
- CONTRACTOR shall ascertain that vendors / suppliers' bids are evaluated and checked with respect to the following:

a) Compliance with the Project applicable codes, standards, specifications, and other special requirements.
b) Conformance of bids with the conditions and requirements of the bid invitation.
c) Deviations / exceptions stated by bidders to the bid invitation.
d) Quality program of Vendors / Suppliers.
e) Evaluation of control measures established by Vendors / Suppliers to monitor their Quality system and activities.
f) Procurement system and use of required raw materials of construction and their appropriate certification and control.
g) In-house inspection capabilities.
h) Compliance with stipulated fabrication, testing, inspection, and acceptance requirements.
i) Preliminary inspection and test planning, including specifying the extent of involvement of COMPANY, CONTRACTOR, Vendors / Suppliers, and Third-Party Inspection (TPI) agencies at appropriate stages of fabrication / assembly.
j) Identification of essential documents as specified in the Project Contract including as built.
k) Past experiences and performance of the Vendors / Suppliers on Projects have similar nature and scope.
l) The foregoing activities, checks, evaluations, & reviews shall be documented and readily available for auditing purposes at the discretion of COMPANY.
m) Location of manufacturing and transportation to the port especially for packages and large size items.

14.5 REVIEW OF PURCHASE DOCUMENTS

CONTRACTOR shall submit to COMPANY purchase requisitions, Data Sheets, and other similar documents to verify application of the appropriate COMPANY Standards and Inspection Requirements.

14.6 VENDORS / MANUFACTURERS PRE-AWARD QUALITY AUDIT

Pre-award quality audits / shop audits are undertaken based on any needs identified as a result of the reviews conducted on proposed vendors / Supplier's Quality management system and technical evaluation results prior to PO award.

COMPANY may also request these audits in the following circumstances:

- When vendor / supplier had a history of inadequate capability, poor Quality or failures with COMPANY or other operating companies.
- When vendor / supplier has not supplied material to COMPANY before.

- When there is major doubts to the Vendor's / Supplier's / Manufacturer's systems and controls, Sufficient experience, facilities, and resources such as machines, manning, and procedures to provide the materials / equipment / items according to the PO's technical, Quality, commercial, and schedule requirements.

Contractors audit team consisting of appropriate Quality members shall conduct this along with discipline engineers (as applicable) and COMPANY shall be invited to witness the audit activities. This audit results shall identify any further actions or precautions required by the COMPANY Project team to ensure that PO requirements are fully met and develop all failure barriers for the product conformity and acceptance.

Pre award audits are normally undertaken on equipment and materials with criticality rating (1) and (2) or others when deemed necessary by COMPANY.

14.7 TECHNICAL BID EVALUATION (TBE)

- CONTRACTOR shall conduct Technical Bid Evaluations on all material requisition for selecting vendors. Vendor document reviews shall be conducted to approve vendor equipment, in line with design requirements.
- CONTRACTOR shall generate detailed Technical Bid Evaluation (TBE) Reports showing, as minimum, compliance to each requirement of data sheets, specifications, material requisitions, etc. The TBE Report template shall be agreed with COMPANY during the early stage of detailed engineering phase. There shall be at least (3) bids per requisition.
- Technical Bid Evaluation template shall be presented to COMPANY for approval.
- COMPANY shall approve technical Bid Evaluation documents before order placement.
- Pre award audits shall ensure digital programmed software & applications for manufacturing, construction, planning, execution and their controls logic gates shall be verified.

14.8 KICK-OFF MEETING (KOM)

- CONTRACTOR shall conduct a Kick-off Meeting (KOM) with any awarded Vendors/suppliers after PO placement with the presences of COMPANY representatives.
- To conduct KOM all necessary documents shall be at least in CODE B.
- List of necessary Document's list shall be in place with respective to specific vendor, manufactures and their sub-CONTRACTORs / sub suppliers if any.
- The objective of the KOM is to clarify and confirm vendors understanding of the requirements and to agree on the following:

➢ Communication channels,
➢ focal points,
➢ planning,
➢ fabrication and delivery schedule,

- PIM dates,
- Controls,
- VDRLs,
- Engineering documents such as drawings, Procedures etc.

14.9PRE-INSPECTION MEETING (PIM)

- Pre-Inspection Meeting (PIM) shall be held with any hired supplier in principle to address critical control activities and related areas of concern.
- PIM shall be held at Vendor's production facility with, and in presence of, all concerned parties / stakeholders (Manufacturer, CONTRACTOR, Sub CONTRACTORs, TPI, and COMPANY Reps…. etc.) shall be conducted before any work commencement to ensure full understanding on the execution SOW, quality requirements and the level of required control on the construction activities.
- Pre-Inspection Meeting (PIM) shall be conducted with any hired Supplier / Principals, For Criticality Ratings one (1) or two (2) and / or equipment with Inspection levels I & II & long leading items, bulk items including piping, structural, E&I items…etc.
- PIM package shall be submitted for COMPANY final review and approval at least two (2) weeks prior PIM commencement.
- Equipment and materials with criticality ratings three (3) and above, PIM shall be conducted upon COMPANY request when deemed necessary.
- Detailed PIM requirements are shown in **Appendix-(H)** of this standard. And also in AGES-AGES-SP-13-002 ”Project Procurement and certification requirements specifications”.

14.10 SHOP INSPECTION AND SURVEILLANCE CHECKS

- CONTRACTOR shall be responsible for carrying out inspection / witness testing, for all equipment materials at Suppliers / Sub-Suppliers premises as specified in relevant ITPs.
- The scope of inspection shall be identified in the inspection and testing plans (ITP), which shall be prepared as per the minimum requirements stated below:
  - Process description.
  - QC requirements.
  - Responsibilities.
  - Applicable procedures.
  - Acceptance criteria.
  - Percentage of tests to be done (including increased inspection levels when performance requirements are not met).

- Verifying documents (Inspection Records Forms).
- Release form records between disciplines.
- Inspection intervention level (review, surveillance, witness and hold).

- All ITPs shall be presented on predefined template as presented on **Appendix (K)** and shall include the requirements of individual codes and standard, Purchase Orders, requisitions, COMPANY developed standards and Specifications, National Standards etc.
- CONTRACTOR shall be responsible for ensuring that all necessary inspections and / or tasks were carried out by competent inspectors from its own organization or from a contracted Inspection Agency approved by COMPANY AVL. (No organization involved in manufacturing or expediting for the Project shall be employed for inspection purposes).
- COMPANY has the right at any time to inspect equipment in manufacturer's premises; CONTRACTOR's Representative shall always accompany COMPANY Representative on visits to SUPPLIERs / manufacturers premises.
- CONTRACTORs, Sub-CONTRACTORs, Vendors / Manufacturers …etc. shall provide all necessary information, cooperation, and access of facilities and documentation to the COMPANY representative in a prompt and timely manner.
- CONTRACTOR shall ensure that timely notice is obtained from manufacturer of availability for inspection with at least two (2) weeks for source inspections outside UAE and one (1) week for source inspections inside UAE.
- CONTRACTOR shall assign Inspection Coordinators who co-ordinate all Project Procurement inspection activities.
- CONTRACTOR shall ensure that the inspection release note, issued by the authorized inspector, confirms that appropriate preservation and protection measures have been undertaken.
- CONTRACTOR shall receive and distribute as necessary all Inspection Test reports maintaining an Inspection Report Register, and Inspection files by Purchase Order containing a copy of all inspection related matters including that of the "Inspecting Authority" where issued.
- CONTRACTOR shall keep strict control of all Material Test Certificates and ensure that deviations have been accepted by COMPANY in writing, prior to conveying acceptance of any such deviations.
- CONTRACTOR has to specify that manufacturers, vendors, sub-vendors and sub-CONTRACTORs shall perform and identify products and materials during manufacturing, production and site construction particularly for corrosion resistant alloys (CRA), alloy steel, non-ferrous and special materials, this shall be performed through positive material

identification (PMI) as per applicable standards, PMI shall also be made for component manufactured at foundries, sub-vendors and suppliers. The CONTRACTOR shall perform PMI at site for any equipment and material when requested by COMPANY.

- COMPANY or its nominated inspector shall have the right to require that additional inspections testing, and PMI be made at CONTRACTORs cost in the event that:
  - Material to be used in the project cannot be identified.
  - A reasonable doubt exists about the authenticity of its identity.
- The CONTRACTOR shall generate and maintain an identification and traceability procedure for all materials, parts and component including partially fabricated assemblies.

14.11 APPOINTMENT OF INDEPENDENT THIRD-PARTY INSPECTION AGENCIES (TPIA)

CONTRACTOR shall engage the services of an independent Third-Party Inspection (TPI) agency, for material certification, the following shall be addressed:

- CONTRACTOR always remains, fully responsible for the inspection work performed by these Third-Party inspection agencies.
- The Third-Party inspection agency shall operate as an independent body and shall not act as or representing of CONTRACTOR.
- The scope of inspection services by the independent Third-Party Inspection agency shall be governed by, and not limited to, the verification of requirements as stipulated in the purchase order and its attachments and / or the requirements as detailed in the Project Quality plan and ITPs.
- COMPANY may review / audit the CONTRACTOR inspection arrangements and systems taking into account the requirements noted above.

14.12 CONTROL OF NON-CONFORMING PRODUCTS

- Non-conformances shall be identified, reported, and resolved as per **Appendix (G)** of this standard.
- The CONTRACTOR shall establish and maintain an effective system for controlling non-conforming material, including procedure for the identification, segregation, presentation and disposition for rework or repair.
- All non-conforming supplies shall be identified to prevent use, shipping, or mixture with conforming supplies. Holding / quarantine areas shall be allocated for segregation. Either at fabrication or construction sites.
- NCRs issued by the CONTRACTOR, sub-CONTRACTORs, Vendors, Manufacturers and Suppliers shall be copied to COMPANY and its representatives for disposition approval.
- CONTRACTOR & COMPANY Issued NCRs shall be registered by CONTRACTOR single NCR Log Register

- CONTRACTOR shall maintain NCRs log sheet, which shall be updated regularly and presented to COMPANY in the regular quality meetings.
- All NCRs shall be dully endorsing by discipline Engineering concurrence & their deposition shall be verified and actions are rectified were dully inspected and reports are signed by respective QA/QC.
- The CONTRACTOR shall investigate the causes of non-conforming items, and initiate corrective actions to prevent reoccurrence. Repair and reworked item shall be re-inspected in accordance with the applicable ITPs without any cost impact to COMPANY.

14.13 PRESERVATION PACKING AND STORAGE

The CONTRACTORs shall prepare procedures and systems to ensure that the appropriate implementation and control of preservation and packing requirements in order to safeguard materials and equipment against corrosion and damage during transit and storage, and that all markings used for identification purposes are protected.

The CONTRACTOR shall prepare short- and long-term storage control measures and procedures for safeguarding materials and equipment (including spare parts) from damage; particularly, in the period between manufacturing and Ready for Installation / Start-up at the construction site.

The following provisions should be addressed in CONTRACTOR's procedure:

- The unique characteristics of individual plant item and their specific requirements for packaging, preservation, storage, and handling.
- Handling and preservation during sea freight including loading and unloading.
- Outside storage and handling at remote desert locations.
- Internal storage and handling at warehouse locations.
- Lifting operations at remote locations.
- Use of suitable materials for packaging and preservation.
- Marking and identification.
- Schedule of inspections of long term stored items including preservation.

14.14 VENDOR / SUPPLIER MATERIAL RECORD BOOK (MRB)

Within two (2) weeks of purchase order award, the Vendor shall submit through CONTRACTOR a proposed "MRB Index". Showing the contents which discussed and agreed upon at the Pre-Inspection Meeting.

The MRB shall contain at least, and not limited to, the following items:

- Purchase requisition including data sheets.
- Purchase order "PO" (un-priced)
- As-built drawings and shall be provided with review, validate, and approval provisions.
- Design calculations provided with review, validate, and approval provisions.
- Inspection and test plans (ITPs).
- Manufacturing procedure specifications (MPS).
- Welding logs and weld maps.
- Welding procedure specifications (WPS's) and procedure qualifications records (PQR's).
- Non-destructive test (NDT) procedures / records.
- Hydrostatic / pressure test procedure / records.
- Leak tightening / pneumatic, fugitive emission tests …etc., procedures (as applicable)
- Heat treatment procedure / records
- Painting / coating records and test certificates.
- Cathodic protection system, as-built documents, and all related testing and commissioning records (as applicable)
- Material test summary and traceability supported with Material Test Certificates (MTC).
- Testing procedures.
- FAT / SAT (Factory / Site Acceptance Tests) procedures and certificates.
- Sub-orders index and orders.
- Inspection release notes (IRN).
- Master log / register of NCR's and analysis of NCRs.
- Technical deviations (TDs).
- Packing, preservation, & handling procedure.
- Final product certificates such as "Certificate of Conformity".

Close out report including all Quality concerns and all lessons Learned covering both positive and negative aspects.

Within three (3) weeks of issuing final IRN, the Vendor shall submit through CONTRACTOR the final MRB as per the approved index.

15. CONSTRUCTION QUALITY REQUIRMENTS

15.1 GENERAL REQUIREMENTS

- CONTRACTOR Quality system shall ensure the control of construction activities including All work associated with Fabrication, Erection, Assembly, Pre-commissioning, and Commissioning assistance and start-up of the Project.

- Control will be exercised using approved PQP, related procedures and method statements while work verification using approved ITP's.
- PQP will state clearly the activity, responsible person, associated procedures, and parameters for measuring construction work quality performance.
- Critical activities, such as welding, non-destructive examinations, and performance testing will be given special consideration.
- The work processes and the Job performers will be suitably qualified to the applicable standards and to the satisfaction of COMPANY requirements in general and the Project specifications in particular.
- Construction activities procedures and method of statements shall detail the technical / actual scope of work, how and where activities will be performed, who is responsible for the actual activity, who is responsible to verifying the activity, and which record / verification document shall be produced.
- All welding procedure qualification tests and welder performance qualification tests shall be subject to witnessing and approval by COMPANY.
- All hydrostatic test headers and lifting gears / equipment / ancillaries shall be tested and certified by a Third Party, and certificates shall be submitted to COMPANY before commencement of any work, prior to proceeding next process.
- All Quality activities including status & records lists shall be compiled as per scope of work and CONTRACTOR shall implement an electronic database (Electronic Data Base Management System "EDMS") referencing the appropriate ITP, procedure, and certification so that the Quality status can be continually monitored as the work progresses. COMPANY shall approve the proposed data base management system.
- The CONTRACTOR shall provide COMPANY with a weekly update of all Quality issues on site together with a regular and brief description of all non-conformances issued.
- As part of the CONTRACTOR's Quality system, CONTRACTOR shall consider that COMPANY will operate their non-conformance reporting system within the Project. Thus, on receipt of COMPANY non-conformance reports (NCRs), CONTRACTOR shall prepare correction and corrective / preventive actions plan within 3 working days. Where such non-conformances are identified as major, the affected produced works, related work processes shall be stopped, and immediate course of actions (i.e., root cause analysis, correction, and corrective / preventive actions) shall be carried out to maintain both the Project progress and Quality up to Project norms.
- The CONTRACTOR's Quality system shall include documented controls for the following construction activities:

➢ All activities connected with ISO 9000 series and this specification herein.

- Receipt, storage, handling and issuance of material and equipment (CONTRACTOR procured and / or COMPANY free issued material and equipment to be included).
- Identification and traceability of all materials in accordance with Contract documents.
- Measuring and testing equipment including calibration and certification.
- Construction / engineering changes and processing of site queries.
- Control of non-conformities and all related correction, corrective, and preventive actions.
- Repair rates, failure cases, and rework percentages.
- Generation and compilation of inspection and test records.

15.2 INSPECTION AND TESTING ACTIVITIES

- The inspection and testing plan (ITP) from the CONTRACTORs and their Suppliers & Sub-CONTRACTORs, shall detail all the manufacturing, fabrication, construction, installation, and commissioning aspects / stages in a logical sequence relating to their work programme.
- Provisions shall be made on the ITP, which allows individual activities to be endorsed (signed off) by the concerned parties as described formerly. ITP shall be prepared as per the minimum requirements of Appendix (E).
- CONTRACTOR shall give or provide all necessary superintendence and constant inspection during the execution of the works.
- CONTRACTOR shall provide, and have continuously available, the equipment required for inspection of all or part of the work. The equipment including (dimensional, metrological, NDT …etc.) shall be suitable for examining, measuring, and testing any work efficiently.
- All inspection equipment shall be attested, calibrated, and certified by independent, recognized, & accredited testing laboratory as per their manufacturer recommendations and / or COMPANY request whenever necessary, and shall be in good condition and properly maintained.
- All NDT procedures shall be prepared by qualified and certified ASNT ACCP NDT Level III or equivalent certification approved by COMPANY.
- All Painting & Coating procedures shall be prepared by qualified and certified NACE Level III or equivalent certification approved by COMPANY.
- The CONTRACTOR shall submit to the COMPANY a written procedure specific to the job for prior approval, after which the techniques (contained in the procedure) shall be qualified by demonstrating satisfactory evidence of compliance with that procedure.
- When there is a requirement for NDT examination in percentage wise of the total number of welds the following requirements shall apply:

- Welds shall be randomly and independently selected throughout the fabrication / construction period and fully examined.

- The random selection shall be equally distributed overall the welders, all type of welds, all welding procedures, all pipe sizes / thicknesses, and all welding position.
- Where reduced percentage of examination is permitted and the resulting test shows defects, then two additional samples of the same kind welded by the same welder shall be given the same type of examination.
- If any of the items found defective, then two further samples of the same kind shall be examined for each defective item found by that sampling.
- This shall continue until fully examined and repaired or replaced as necessary to meet the specification requirements.

- CONTRACTOR shall establish an RT Films Digitisation System as per ASME V Article II capable to Display, process, quantify, store, and retrieve conventional radiographic films into digital images, to achieve the following objectives:
  - Enable digital archiving of radiographic films without loss of quality.
  - Reduce storage space and costs.
  - Improve accessibility of data.
  - Streamline and semi-automate report generation.
  - Eliminate accidental damage of films due to handling.
  - Extend archive life.
- Where radiography is not practical to use at site, advanced NDT techniques such as Phased Array (PAUT) or AUT may be allowed in lieu of radiography subject to procedure qualification and approval of COMPANY.
- All advanced NDT techniques shall be witnessed, and the test results shall be interpreted by the CONTRACTOR / Sub-CONTRACTOR's certified ASNT ACCP level III, or CSWIP / PCN level II.
- RT backlog % (or another agreed advanced method of comprehensive testing) for any system shall not exceed 2 days' of production for pipelines and 3 days for piping works; otherwise, welding activities shall be stopped until safe clearance of that backlog.
- The required minimum qualifications of any RT / UT interpreter shall be:
  - ASNT ACCP NDT Level III, or
  - PCN Level II in RT, PAUT, AUT, or
  - CSWIP Level II in RT, and
  - Minimum (7) years of experience after certification date with suitable experience in the Oil & Gas.
  - In addition to the above, the pre-selected candidate will be subjected to assessment and face-to-face interview by COMPANY as well as on-job probation period.

- The CONTRACTOR or Manufacturer in charge, shall meet the required standard specification, and practice for Quality management systems set by COMPANY to control the independent or in-house organizations performing non-destructive testing (NDT).
- NDT testing organization / Sub-CONTRACTOR shall be subject to systematic verification / audits and assessment process to verify their compliance with COMPANY requirements.
- CONTRACTOR / Sub-CONTRACTOR shall assist COMPANY's representatives in the execution of inspections and tests by providing personnel, inspection, and test equipment as required.
- Material traceability and Positive Material Inspection (PMI) shall be in accordance with approved procedures and as per COMPANY reference standards, any PMI check for welding joint shall be 3 readings: Base metal 1, Weld joint, Base metal 2.
- CONTRACTOR shall review and track Project errors & failures such as welding & welder repair rates on a daily basis. Weld repair rates and on-spot welders' performance shall be evaluated on a weekly basis.
- Welds and welder repair rates / percentages for piping, pipelines, steel structures, pressure vessels, storage tanks, plate work …etc. shall be closely monitored by the CONTRACTOR and reported to COMPANY on weekly and monthly basis in statistical analysis manner.
- Repair rate / percentage shall be calculated based on the number of tested joints by RT, UT, MT or DPT (as applicable), for pipelines, piping, & steel structures, while to be calculated by metric length of tested joints for storage tanks, pressure vessels, and other plate work considering the following:

➢ Repair rate / percentage shall not exceed 3% of the total number of welded joints or the total welded length in a week as detailed above.

➢ In case the weekly repair rate / percentage exceeds 3%, a full detailed investigation shall be carried out by the CONTRACTOR to detect the root cause of the defect, eliminate it, and implement corrective measures to prevent recurrence and reduce the repair rate / percentage to 3% or less.

➢ When weekly repair rate / percentage exceeds 5%, CONTRACTOR shall be officially warned by COMPANY and work shall be stopped until satisfactory completion of the investigation and root cause analysis associated with the courses of rectification, corrective, and preventive actions which shall be accepted and approved by COMPANY.

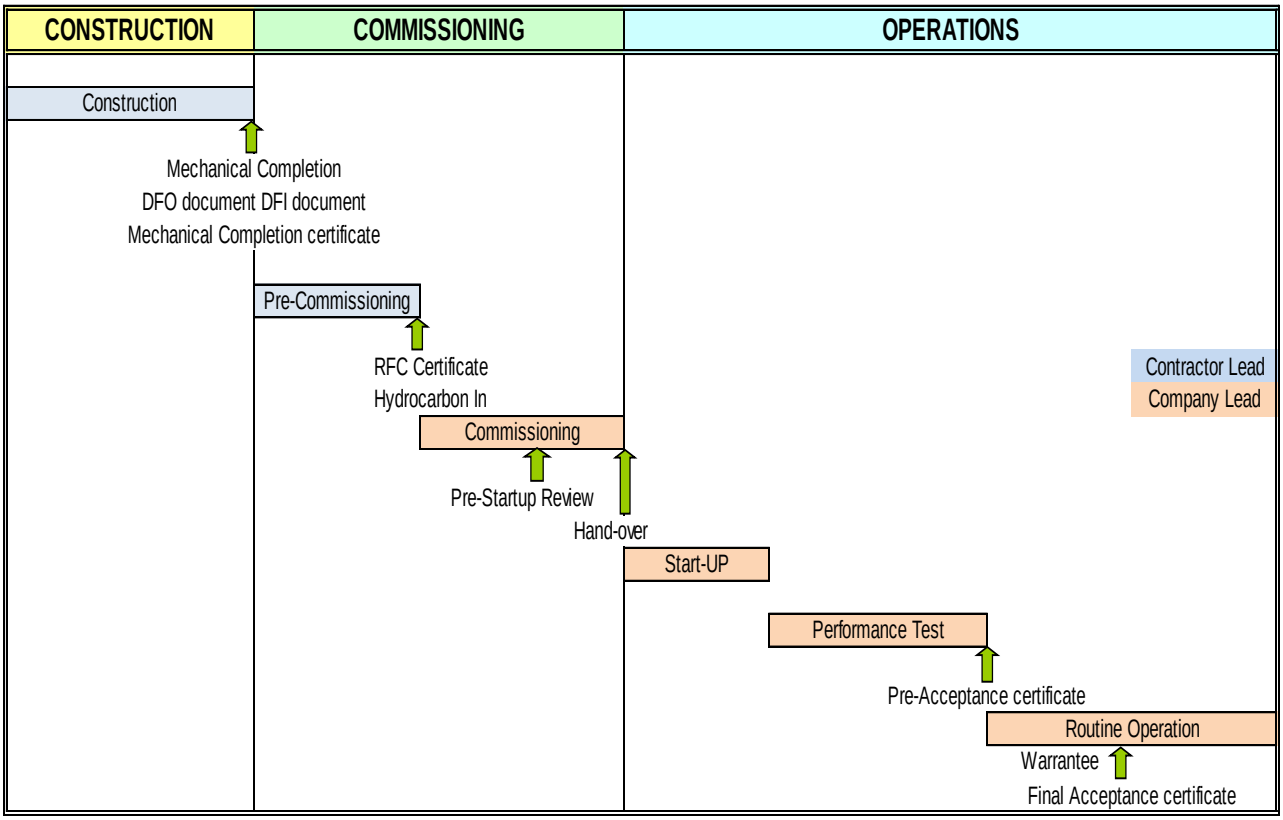
➢ Overall, cumulative weld repair rate / percentage shall be reported on weekly and monthly basis through the periodic Quality reports.

➢ CONTRACTOR shall be proactive with regards to monitoring the weld /welder repair rates and elimination of the potential causes that might lead to the critical limits.

- Welders' repair rate / percentage shall be monitored on a weekly basis and shall not exceed 3% of the total welders' weekly production.

16. MECHANICAL COMPLETION, PRE-COMMISSIONING

CONTRACTOR shall complete Mechanical Completion, Pre-Commissioning on subsystem basis, and turnover the entire project and successfully complete all checks and tests to the stage when the system (or part-thereof) is ready for Commissioning.



(Figure -5) Project Certification Milestones

CONTRACTOR shall develop separately and submit for COMPANY approval Prior to the first Mechanical Completion date, for any section of the Project, the following Plans:

- Mechanical Completion Plan.
- Pre-commissioning Plan.
- Commissioning Assistance Plan.

Each plan shall include, but not be limited to the following as a minimum:

- The approved battery limits: sections / sub-systems for pre-commissioning, Commissioning, and shutdown activities.
- CONTRACTOR's Organization chart for each plan, including CVs of key staff.

- List of vendors involved in each plan, including schedule, duration, and CV of each.
- Vendor representative (Vendor Mobilization plan including their involvement during Commissioning).
- Sub-contracting plan in case of special services like intelligent pigging and other Services.
- Detailed execution method, philosophy, plan and procedure including schedules,
- Methodologies for each plan Sequence of Start-Up and Commissioning.
- Identification Commissioning spares and their list.
- Interfaces with existing operating or new facilities and developing co-ordination Procedure.
- Pre-commissioning for Tie-ins and identification of Tie-in schedule.
- Schedule for Mechanical Completion and Ready for Commissioning for each Section / sub-system of the Project.
- Identification and list of activities, which involve COMPANY inspection and tests.

CONTRACTOR shall utilize a Construction Commissioning Management System / Project Completion System (Software). The software package shall ensure the following:

- The Project is mechanically complete, commissioned and certified ready for safe Operation.
- The Project documentation is complete for use during the life of the Asset.
- Trainings shall be provided by the Vendor for COMPANY employees.
- It shall be a proven software package used in the oil & gas industry. The number of user Licenses shall be unlimited for the whole of the project and for unlimited time.
- It shall be populated by CONTRACTOR with a full set of engineering data for each discipline containing all relevant equipment information (e.g., DWGs, P&IDs, data sheets, etc.). In addition, it shall have data registers that hold all references (project coding, systems, areas - etc.), Documentation, procedures, tests, scanned images, pictures and so on.
- The software package shall incorporate the tests and procedures for the total scope of work and schedule. It shall be capable of holding O&M Manuals, specifications,
- Calculations, vendor information, etc. The system shall be capable of generating all kinds of reports and checklists from the data information centre. The reports shall be schedule based and supply alerts of activity points to be completed. All generated information shall be stored in a historical database.

CONTRACTOR shall employ project and commissioning software package specialists experienced in setting up (descriptions and codes) the database. The specialists shall produce, control and close-out all documents and activities to complete closure of the Project.

CONTRACTOR shall ensure that all systems and subsystems are tested as specified and all the major punch list items are closed before releasing for the commissioning activities.

CONTRACTOR shall carry out Commissioning Process activities as per the "Commissioning Plan", which must be developed, updated, and finalized during the design phases of the package of the Contract.

The "Commissioning Plan" shall be supported by the "Commissioning Procedures" which will take into account issues noted below and the precise terms and conditions of the Contract including applicable specifications.

17. QUALITY REPORTING

Quality reports shall be issued by CONTRACTOR in weekly, biweekly and monthly basis, or as deemed appropriate by the COMPANY Quality team with regards to the project size / phase and nature of work.

As a minimum, the Project Quality Report shall cover the following areas:

1) Engineering:
   - Summary of the Project progress (based on the detailed planning progress report).
   - Areas of concern with recommenced corrective actions.
   - Log for Technical Deviations (TD) and Technical Queries (TQ), with status.

2) Procurement:
   - Procurement status (TBEs, KOM, PIM, FAT and expected delivery date) with the monthly inspection calendar for the procured items, and 3-months look-ahead Plan especially for PIM & FAT.
   - Log for local and worldwide RFIs (Requests for Inspection).

3) Construction:
   - Weekly and cumulative weld & welder repair rates with weld defects analysis for piping, pipelines …etc. separately.
   - Site QA / QC Activities in progress during the period.
   - Material and equipment receiving inspection status during the period.
   - RT backlog.
   - Log for local RFIs (Requests for Inspection).
   - Monthly and cumulative weld & welder repair rates with weld defects analysis for piping, pipelines …etc. separately.
   - Actual number of all cut-out & re-welded joints and the reason (s) for cutting (e.g., site modification, new revision, repairs …etc.).

4) Quality Assurance:
   - Summary of developed Project Quality Plan (PQP), procedures, work instructions, and Quality control plans, with respective reviews, approvals, and issue status (including Sub-CONTRACTOR / Vendor documents).
   - QA / QC Organization status (plan for allocation /demobilization of Quality personnel, and any approved changes).
   - Summary of all internal and external audits carried out, reported against the audit schedule.
   - Major areas of concern or weakness identified in the Quality system and details of any investigations to prevent the recurrence of failures.

- Log for Project NCRs (internal & external) with corrective action reports, status, and the planned dates for follow up & close-out.
- Log for audit CARs (Corrective Action Requests) with summary of all internal and external audits carried out & reported against the audit schedule.
- Quality KPIs statistics and analysis.

Quality review meetings shall be held between CONTRACTOR quality heads and their counter parts from COMPANY to discuss the above-mentioned points in a weekly, Bi-weekly or monthly basis, or when deemed necessary by COMPANY.

18. APPENDICES

APPENDIX (A): TYPICAL PROJECT QUALITY PLAN (PQP) CONTENTS

The following aspects shall be covered in the CONTRACTOR's Project Quality Plan (s) in addition to the ISO 9000 & 10005 requirements:

1. **Cover Sheet and Revision History**
   a. Document purpose
   b. Policy statement
2. **Introduction**
   a. Project scope and background
   b. Project constraints
   c. QA standards
   d. Project specifications
3. **Execution Strategy**
   a. Project risks
   b. Critical activities
   c. Control strategy
   d. Project schedule
   e. Project Quality Objectives and KPIs
   f. Commissioning & handover
4. **Organization, Responsibilities, & Interfaces**
   a. Project general organization chart with nominations
   b. Project QA/QC detailed organization chart with nominations
   c. Project Interfaces (internal & external)
   d. Definition of specific roles and responsibilities
5. **Project documentation control and traceability system**
   a. Main CONTRACTOR documentation /records control system
   b. Control of Sub-CONTRACTORs and Vendors documents /records
   c. Project documentation handover and retention policy
6. **Integration of CONTRACTORs & Suppliers**
   a. Define CONTRACTOR interfaces
   b. CONTRACTOR and Supplier Quality system

7. **Audits and Reviews**
   a. Schedules and details for:
   b. Technical audits.
   c. QA audits (internal & external)
   d. Procurement reviews
   e. Lessons Learnt review (previous projects)
   f. Safety reviews (PHSER, HSEIA, HAZOP, QRA, HAZID, PSSR, SIL, etc.)
8. **Quality Process Improvement**
   a. Lessons Learnt methodology of collection and compilation.
   b. Project close-out

   The following shall be referred in PQP as applicable.

   I. SOW / TOR
   II. All applicable procedures
   III. HSE manual
   IV. Job description
   V. Approved Vendors & CONTRACTORs lists
   VI. Review matrices
   VII. Coordination procedure
   VIII. Environmental guidelines and risk assessment
   IX. Construction guidelines
   X. Standards & specifications
   XI. Control terms & coordination
   XII. Other QA/QC plans
   XIII. Other HSE plans
   XIV. Execution statement requirements
   XV. Tender evaluation criteria
   XVI. Deliverable's list

APPENDIX (B): CONTRACTOR PROJECT ORGANIZATION REQUIREMENTS

GENERAL

- Project Specific organization is the only acceptable organization to COMPANY with fully dedicated team members to the Project. CONTRACTOR shall not share its personnel with any other Project or single business activity related to CONTRACTOR or COMPANY sides.
- CONTRACTOR shall formalize the acceptance of the personnel to be appointed for the Project key positions and shall seek the approval of COMPANY before confirming their assignments, which will be subject to review of CVs and face-to-face interviews.
- Approved key personnel shall not be replaced or demobilized until Project completion, unless the CONTRACTOR has submitted very strong reasons and justifications for the replacement / demobilization, which shall be subject to COMPANY approval prior to any release from the Project.
- Key personnel are defined as any CONTRACTOR project person holding a managerial, team leading or supervisory role (I.e. Directors, mangers, team leaders, superintended or senior engineers)
- The CONTRACTOR project organization shall include a detailed description of CONTRACTOR's organization relevant to the Project work-scope which should include:
  - An organization chart of the CONTRACTOR's Project Management Team, Interfaces with COMPANY, Sub-Contractor's, Third Parties …etc.
  - The proposed Key staff that will be involved in the Project supported with their CV's showing: qualifications, valid certificates & licenses, training, and experience relevant to the proposed

    B.3 Acceptance of QA / QC Personnel
  - CONTRACTOR shall formalise the acceptance of the personnel to be appointed specifically for QA/QC tasks and shall seek the approval of COMPANY before confirming their assignments.
  - All qualification certificates shall be valid, and shall be presented with each CV.
  - Previous ADNOC acceptance will be considered but cannot guarantee approval or acceptance for the new project.

GROWTH / REDUCTION OF QA ORGANIZATION

CONTRACTOR shall obtain approval from COMPANY about the schedule and mobilization / de-mobilization of the initially assigned QA / QC personnel in order to ensure adequate schedule of resources.

As with safety, quality is the responsibility of top management and of every individual working within the organization and on the project backed up by the dedicated and specific quality personnel with a functional reporting to the organizational quality responsible.

APPENDIX (C): QUALITY DOCUMENTS CATEGORIZATION

The below list showing a sample of quality documents and their categorization, CONTRACTOR shall prepare a comprehensive quality document list related to the project and send for COMPANY approval.

SN	Description	Category
1	Project Quality Plan (PQP)	1
2	Inspection and Test Plans (ITP)	1
3	Manufacturing Procedures	3
4	Material Identification and Traceability Procedure	2
5	NDT/ Heat Treatment Procedures and Test Plan	2
6	Quality Audit Plan and Procedure	1
7	List of selected Welding Consumables	3
8	Construction – Quality documents - QCP's , MS etc	1
9	List of Testing Equipment / Calibration	2
10	NCR's	1
11	WPS, PQRs and Welders Qualifications	1
12	EPC CONTRACTOR Rep. / TPI Rep. CV's	1
13	MTC's	2
14	Testing procedures	1
15	Construction – Quality reports	2
16	Pre-Inspection Meeting Package	1

Category	Description
1	Documents, which require formal approval of COMPANY.
2	Documents to be issued for comments only, without requiring formal approval from COMPANY.

3	Documents to be issued for information only.

APPENDIX (D): INSPECTION AND CERTIFICATION LEVELS

Inspection and certification levels shall be as per ADNOC specification **AGES-SP-06-001 – Project Procurement and certification requirements.**

APPENDIX (E): KEY PERSONNEL COMPETENCE, TRAINING AND AWARENESS

CONTRACTOR shall ensure the competency and qualification of all personnel and their experience in their respective areas.

The PQP should reference or contain a system for managing and assuring the competence of those responsible for executing and controlling the quality. All persons responsible for executing and controlling the work should be competent, properly qualified, and skilled and experienced in accordance with the project requirements.

Training needs should be identified and provided when a gap in competency is identified as needed. All qualification, training and competency records shall be maintained. All records shall be made available to the COMPANY for verification as and when required by the COMPANY. CONTRACTOR shall submit training matrix for discipline and personnel involved in the project activities. The matrix shall include the name of personnel, discipline tentative week for training and core competencies or area identified for training. The matrix shall be continuously updated throughout the project life.

Awareness Training programs should be made available to those persons who are responsible for controlling the quality of the work to ensure that they are aware of the Quality Management System requirements and be updated with COMPANY Quality Policy and Objectives as part of Project Induction Training/Awareness. This Training should not only include Quality staff but also other staff in the Project affecting the Quality of work being executed.

CONTRACTOR Quality Manager or his delegate shall conduct quality toolbox meeting on a weekly basis to CONTRACTOR/SUBCONTRACTOR quality inspectors and to maintain records as evidence.

Before starting any construction activity toolbox meeting addressing the specific quality requirements shall be conducted for the craftsman involved in the WORK.

APPENDIX (F): EX-STOCK MATERIALS QUALITY REQUIREMENTS

In the event COMPANY accepts the CONTRACTOR's technical justification, to supply Ex-Stock materials, CONTRACTOR shall comply with all of the following requirements for recertification and final product assessment:

- This type of deviations shall be treated on a case-by-case basis and shall not be a common practice. Hence, this waiver shall be limited to the requested specific list of materials after COMPANY approval.
- Recertification and final product assessment process shall fully comply with COMPANY Projects Quality System requirements, FEED deliverables requirements, Piping Material Specification, Specifications, Shell MESC, and the applicable international standards.
- CONTRACTOR shall provide the requested overall list of stock items (detailed with item description, quantity breakdown, size, schedule, grade, production date, design, vendor name …etc.).
- Vendors shall be selected from COMPANY approved Vendor’s list.
- Existing MTCs shall be reviewed, verified true copies, and stamped by an independent TPI, and shall comply with the applicable COMPANY &International Specs.
- TPI, from COMPANY approved CONTRACTOR s list, shall check each and every item visually and dimensionally (100%) to verify the surface condition, marking, material grade, dimensions, Vendor name & logo, quantities ...etc.
- Production date shall be not older than two (2) years for Carbon Steel materials and three (3) years for Alloy Steel from the current date.
- Samples shall be selected from all stock materials and tested in COMPANY approved laboratories (as per COMPANY AVL) for the applicable full mechanical, full Chemical, and Corrosion tests, irrespective of coverage of any test by the 3.2 type certificates, such tests shall be witnessed / verified by TPI, CONTRACTOR, and COMPANY representatives.
- Sampling shall be no less than one item per each heat or one item per each ten (20) pieces of materials having the same heat item description, material standard & grade, and combination of diameter & thickness, whichever is greater.
- The microstructure of ferritic-austenitic stainless steels forgings shall be examined to assess the ferrite content and presence of detrimental phases, as applicable.
- In case of any test failure, the same item or heat may be retested with two (2) additional sets of specimens taken from the exact same locations after concurrence with COMPANY quality retests may be allowed only one time, after which, the whole heat shall be rejected and isolated from the project materials.

- CONTRACTOR shall submit an ITP for each combination of similar items to include all the testing & verification stages, acceptance criteria, and intervention of all involved parties. The ITPs shall be prepared as per **Appendix (K)** and shall be approved by COMPANY before commencement of related works.
- New certificates type 3.2- according to EN 10204 shall be issued and endorsed by a recognized international Third-Party Certification Agency (listed in the COMPANY AVL). The new certificate issued shall be supported with original complete traceability with the 3.1 certificate.
- COMPANY has the right to request any additional verification test if deemed necessary, at the CONTRACTOR's cost.
- All costs related to testing, TPI involvement for verification, review, witnessing, & recertification shall be borne by the CONTRACTOR.

APPENDIX (G): CONTROL OF NON-CONFORMANCES

- The CONTRACTOR shall establish and maintain an effective system for controlling non-conforming material, including procedure for the identification, segregation, presentation and disposition for rework or repair.
- All non-conforming supplies shall be identified to prevent use, shipping, or mixture with conforming supplies. Holding / quarantine areas shall be allocated for segregation. Either at fabrication or construction sites.
- NCRs issued by the CONTRACTOR, sub-CONTRACTORs, Vendors, Manufacturers and Suppliers shall be copied to COMPANY and its representatives for disposition approval.
- CONTRACTOR shall maintain NCRs log sheet, which shall be updated regularly and presented to COMPANY in the regular quality meetings.
- The CONTRACTOR shall investigate the causes of non-conforming items, and initiate corrective actions to prevent reoccurrence. Repair and reworked item shall be re-inspected In accordance with the applicable ITPs.

APPENDIX (H): PRE-INSPECTION MEETING (PIM) REQUIREMENTS

- CONTRACTOR shall prepare a list of vendors at which PIM will be undertaken, followed by three (3) months look ahead PIM plan shall be prepared and sent to COPMANY in a regular basis, in order to allow enough time for COMPANY to plan its representatives / TPI mobilization.
- PIM package shall be submitted for COMPANY final review and approval at least two (2) weeks prior PIM commencement.
- CONTRACTOR shall confirm PIM date by issuing notification to COMPANY at least three (3) weeks before commencement date.
- PIM minutes of meeting (MOM) shall be officially submitted to COMPANY within two working days post PIM commencement.
- PIM meeting shall be arranged by the vendor when the following requirements are met:

➢ The engineering work related to the equipment or material is substantially completed and manufacturing could be started.
➢ The COMPANY comments on the engineering, design and quality have been resolved.
➢ That the engineering requisition and un-priced purchase orders have been received, reviewed and accepted.
➢ That all relevant procedure has been received and accepted by COPMANY.
➢ That all quality plans and ITPs including those related to sub-vendors have been. Received, reviewed and previously e approved.
➢ The following is a typical PIM package contents which should be prepared by CONTRACTOR:
➢ Pre-inspection meeting agenda.
➢ Final approved purchase order (un-priced).
➢ The approved material requisition.
➢ Production schedule.
➢ Approved drawings.
➢ The final approved specifications as a part of PO.
➢ The approved manufacturing procedures.
➢ The approved inspection and test plans (ITPs).
➢ NDT procedures and NDT operator’s qualifications.
➢ Inspection and testing procedures.
➢ Manufacturer / Vendor approved CV’s (for key personnel) with the organization chart.
➢ Technical clarifications / deviations (if any) as authorized / approved by COMPANY.
➢ Notification of the appointed Third-Party Inspection Agency (TPIA) and the approved CVs for assigned TPI personnel.

- Welding book (as applicable) including: WPSs / PQRs, Base Material Certificates, etc
- The following is a typical PIM agenda that should be followed by all parties involved:
- Introduction and objectives.
- Equipment or material involved.
- Review of purchase order and appendices to verify completeness and confirmation to contract specifications, procedure, drawings, etc.
- Review of exceptions or deviations to purchase order (If any).
- Raw materials, sub vendors and manufacturing/testing locations.
- Review of vendor QMS.
- Verify the calibration certificates related to measurement and testing instruments.
- Review of Vendor project organization.
- Status of vendor procedures.
- Review of manufacturing procedures, specification, and qualification.
- Production schedule and inspection program.
- Traceability and certification.
- Inspection and testing.
- Third party inspection.
- Quality records.
- Review and final marking of the manufacturing quality plan (ITP).
- Inspection release and shipping release.
- Non-conformances procedure.
- Point of contacts and communication channels.
- Inspection notifications.
- Manufacturing record book (MRB) requirements.
- Areas of concerns.
- Any other business.
- Mill/shop tour.

APPENDIX (I): PROJECT KEY PERFORMANCE INDICATORS (KPIS)

CONTRACTOR shall establish a project KPIs as per the below table .CONTRACTOR shall measure; monitor and report project Key Performance Indicators on monthly/weekly basis as applicable. Reports shall be provided to COMPANY detailing any improvement actions taking place if the KPI's are not meeting the targets. Contractor may revise the KPIs or the measuring frequencies in agreement with the COMPANY to fit to Project requirements and nature.

Sl.No.	Activities	Key Performance Indicators(KPI)	Key Focused Area	Unit	Frequency	Target Performance
1	HAZOP actions outstanding	No. outstanding / (No. raised) Highlight by type (e.g., HAZOP / HAZID)	Engineering/Design	%	Monthly	<5%
2	Holds outstanding	No. design issues/queries closed in month / (Total number raised)	Engineering/Design	%	Monthly	<5%
3	No. Design Changes and/or Deviations resulting in changes to design basis	No. design changes and/or deviations resulting in changes to design basis	Engineering/Design	Nos	Monthly	NA
4	Design deliverables	No. of document delivered late / No. required by schedule	Engineering/Design	%	Monthly	<5%
5	Audits and Reviews	Performed/Planned	Quality	%	Quarterly	>90%
6	Quality audit Findings	No. of cleared in the month/ (No, required due in the month)	Quality	%	Quarterly	>90%
7	Organizational Resources	No. Resources /(No. Planned)	Quality	%	Monthly	>90%
8	NCRs	No. open/total No. raised	Quality	%	Monthly	<5%
9	Repeat NCRs	No. Repeated NCRs in month/ Total No. NCRs	Quality	%	Monthly	<5%
10	Quality Observations (near-miss/ defect prevention)	No. Quality Observations (near-miss/defect prevention) in month	Quality	Nos	Monthly	NA
11	Weld repair rate For 100% NDE specifically to RT (or PAUT)	No. of welds repaired in week × 100/(Total No of Radiographed week)	Quality	%	Weekly	<3%
12	NDT Backlog /Pipeline(RT or PAUT)	No of joints back logged	Quality	Nos	Weekly	No more than 2 consecutive days of

						welding production
13	NDT Backlog /Piping(RT,MT,PT)	No of joints back logged	Quality	Nos	weekly	No more than 3 consecutive days of welding production
14	Back Log PWHT	Backlog of 5 joints per day	Quality	Nos	Monthly	Backlog <5 Nos joints Per day
15	Coating Rejection Rate	Coating Repair Rate<1%	Quality	%	Monthly	Coating Repair Rate <1%
16	Painting Rejection Rate	Painting Repair Rate<1%	Quality	%	Monthly	Painting Repair Rate <1%
17	No of POs issued	Number of PO's issued vs planned	Procurement	%	Monthly	> 80%
18	Pre Inspection Meeting(PIM)	PIM meetings conducted prior to start of fabrication/supply	Procurement	%	Monthly	100% of Class (1) and (2) Equipment
19	Closure of Supply Chain NCRs	No. closed in month / No. req. by due date*	Procurement	%	Monthly	>90%
20	Holds outstanding	No. interface issues/queries closed in month / Total No. outstanding	Procurement	%	Monthly	>90%
21	Vendor ITP witness and hold points	No. of witness & hold points missed / No. of witness & hold points scheduled	Procurement	%	Monthly	<5%
22	Vendor Quality Records & Data outstanding	No. of documents delivered late × 100/ No required by schedule	Procurement	%	Monthly	<5%
23	Equipment Delivered with NCRs open (MANDATORY KPI)	Equipment that passed inspection from the Contractor or Subcontractor and/or Principal that is delivered to the next stage with a Nonconformance	Procurement	Nos	Monthly	0
24	RFC documentation Hand-over	No. of documents delivered /(No required	Documentation	Nos	Monthly	>95%
25	Construction ITP witness and hold points	No. of witness & hold points missed / No. of witness & hold points scheduled	Construction	%	Monthly	<5%
26	Contractor/ Subcontractor Inspection resourcing	Inspectors available /planned (by discipline)	Construction	%	Monthly	>90%

27	Site Queries	No. cleared in month / Total No. outstanding	Construction	%	Monthly	>90%

APPENDIX (J): CONTRACTOR AND LOWER TIER SUB CONTRACTOR, VENDOR QUALITY PERSONNEL REQUIREMENTS

The objective of this appendix is to define contractor's Quality Control, Quality Assurance and Inspection personnel head count, competency requirements and their roles & responsibilities.

This Appendix covers Quality Personnel for Main Contractors, Sub- Contractors Vendors, sub vendors, covering all phases from Engineering through Procurement, Construction until Commissioning and Handing over to Company.

This Specification is not applicable to quality personnel whom representing ADNOC and their operating Companies.

Tables-1, 2 and 3 defines the minimum requirement of Contractor's Quality personnel in terms of the required quality disciplines and head count.

Table-1 Minimum Contractor's Quality Organization. (Onshore /Offshore projects).

Project Value in USD (EPC Value)	**Below 50M USD**	**From 50M to 200M USD**	**Above 200M USD**
Overall Project Quality Manager (PQM)		Full time PQM to manage all Project phases QA/QC	Full time PQM to manage all Project phases QA/QC
Construction Quality Manager (CQM)		Full time CQM to manage all construction Site QA/QC	Full time CQM to manage all construction Site QA/QC
Sr. QC Engineer	Full time Sr. QC Eng. to manage all Project QC functions	Full time Sr. QC Eng. to manage all Project QC functions	Full time Sr. QC Eng. per each discipline as applicable E&I, CIVIL, Material Mechanical; etc.
Sr. QA Engineer		One full time to manage all Project phases QA activities and Audits.	One full time to manage all Project phases QA activities and Audits.
Lead Procurement QC Eng.			One Full time Lead Procurement QC Eng, to manage Procured equipment /Materials QC.
Procurement QC Coordinator	One full time to coordinate all Procurement QC activities	One full time to coordinate all Procurement QC activities	One or more full time to coordinate all Procurement QC activities.

QC Engineer (Procurement)	Min. one Full time QC Eng. to manage all Procurement QC	Min. one full time QC Eng. Per discipline to Manage all Procurement QC.	Min. one full time QC Eng. Per discipline to manage all Procurement QC
QC Engineer (Construction)	One	One per discipline	One or more per discipline based on project complexity
QA Engineer	One QA Engineer to manage all Project QA functions and audits.		Contractor to decide based on the complexity of the Work
Sr. Painting/ Coating Engineer	One part time	One full time	One Full time Sr. Painting Engineer
Sr. WELDING ENGINEER	One part time Welding Engineer	One full time Sr.Welding Engineer	One Full time Sr. Welding Engineer
NDT Level III or Equivalent	One part time	One full time	One full time
QC supervisor			One /discipline for each 6 Inspectors onshore & 1 for offshore.
QC Inspector	Refer to Table - 2		

Table-2 Shop /Construction site QC Inspectors requirements for Onshore projects.

Discipline	Contractor	Sub-Contractor
CIVIL/STRUCTURAL/GRE		
Earth Works & Paving	1 per 5 Sub-Contractor Inspectors	1 per 50 Workmen
Concrete Foundation	1 per 5 Sub-Contractor Inspectors	1 per 25 Workmen
Buildings	1 per 5 Sub-Contractor Inspectors	1 per 50 Workmen
Steel structural(site or shop)	1 per 5 Sub-Contractor Inspectors	1 per 25 Workmen
GRE Works*	1 per 5 Sub-Contractor Inspectors	1 Per 10 Workmen

HVAC & MEP	1 per 5 Sub-Contractor Inspectors	1 per 25 Workmen
Refractory & Fire proofing	1 per 5 Sub-Contractor Inspectors	1 per 25 Workmen
Mechanical/ Piping		
Receiving Inspector	1 at each Site Warehouse	1 at each Site Warehouse
Rotating & Mechanical Inspector	1 per 5 Sub-Contractor Inspectors	1 per 15 Workmen
Piping	1 per 5 Sub-Contractor Inspectors	1 per 25 Workmen
Valve testing	1 per Valve testing Location	NA
Coating and Insulation	1 per 8 Sub-Contractor Inspectors	1 per 3 crews per Site
Test Pack Coordinator	As per Requirements. (Minimum One)	Minimum One
Welding		
Receiving Inspector	1 at each Site Warehouse	1 at each Site Warehouse
Field and shop Welding	1 per 5 Sub-Contractor Inspectors	1 per 15 Workmen
NDT & PMI&PWHT/Hardness Coordinators	As per Requirement (Minimum One) and based on NDE volume and locations, more are required.	Minimum One in addition to RT film interpreters. More are required depends upon volume of NDE and spreads/locations
Welding Engineer*	1 per Work Site	
NDT Engineer*	1 per Work Site	
PIPELINE WOKS		

Receiving Inspector	1 at each Site Warehouse	1 at each Site Warehouse
Stringing & Bending	1 per Project.	2 per Project.
Field & Repair Welding	1 per each Crew(Onshore)	2 per Crew mainline & Tie ins. I per Repair Crew
NDT	1 Per each Crew – At Site for AUT. Rest – At Site office – As required. For RT, separate film interpreters are required.	1 Per each Crew – At Site for AUT Rest – At Site office – As required. For RT, separate coordinator and film interpreters are required
Backfilling (onshore only)	1 for each Crew	1 for each Crew
Coating Inspector	1 for each Crew	1 for each Crew
Hydro test Coordination & Document Review	1 Quality Engineer	NA
Cathodic Protection	1 Per Project	1 Per Project
Electrical / Instrumentation.		
Electrical and instruments material Receiving Inspector	1 at each Site Warehouse	1 at each Site Warehouse
Electrical / Cathodic Protection	1 per 5 Sub-Contractor Inspectors	1 per 25 Workmen
Instrumentation	1 per 5 Sub-Contractor Inspectors	1 per 25 Workmen
Calibration of Valves	1 per Crew	1 per Crew
Telecom	1 per Site	1 per Site
* All site GRE installation and testing shall be witnessed, supervised by manufacturer technical representative on full time basis. All inspection records to be endorsed for good workmanship.		

- For every 5 Contractor Inspectors or more per discipline, there shall be one QC engineer and QC supervisor in that discipline. Similarly for every 5 Sub-Contractor Inspectors or more per discipline, there shall be one QC engineer and one QC supervisor in that discipline
- A minimum of one (1) QC engineer and one (1) QC Inspector will be assigned by Contractor/Subcontractors for each position above if the number of workers/labours/welders/technicians and QC Inspectors performing the activities is below the specified ratio.
- The Above personnel requirements will apply to Contractor if no Subcontractor is involved.

Table-3 QC Inspectors Requirement On Vessels For Offshore Projects Only.

Discipline	Required inspectors
Pipelines	
Welding Inspectors	1 Per Vessel for each shift
Multi disciplines Inspectors [Coating, AUT& Mechanical]	1 Per Vessel for each shift
Pigging/Tie-in/Flushing & Dewatering/Sampling:	
Multi disciplines Inspectors	1 Per Vessel
Deck, Jacket and other Installations:	
Multi disciplines Inspectors	1 Per Vessel
Deck, Jacket and other Installations:	
Multi disciplines Inspectors	1 Per Vessel
Hook-up:	
Multi disciplines Inspectors	Multi disciplines Inspectors

Qualifications Requirements

Project Quality Manager:

- Bachelor of mechanical or metallurgical engineering, or other relevant engineering degree.
- Certified ISO 9001 Lead Auditor.
- Having a total experience of min. 20 years with specific experience as a QA / QC manager for min. 5 years in the Oil & Gas Projects.
- Good command in Project Quality auditing.
- Strong personality and leadership skills.
- Fluent English lingual skills.

Construction Quality Manager:

- Bachelor of mechanical or metallurgical engineering, or other relevant engineering degree.
- Certified ISO 9001 Lead Auditor.
- Having a total experience of min. 20 years with specific experience as a QA / QC manager for min. 5 years in the Oil & Gas Projects.
- Relevant background in welding, NDT, and coating / painting.
- Strong personality and leadership skills.
- Fluent English lingual skills.

Project Quality Assurance Manager:

- Bachelor of mechanical or metallurgical engineering, or other relevant engineering degree.
- Certified ISO 9001 Lead Auditor.
- Having a total experience of min. 20 years with specific experience as a QA manager for min. 5 years in the Oil & Gas Projects.
- Good command in Project Quality auditing.
- Strong personality and leadership skills.
- Fluent English lingual skills.

QC Senior Engineer

- Bachelor of mechanical or metallurgical engineering, or other relevant engineering degree.
- ISO 9001 Lead Auditor.
- ASNT Level II in RT, UT, MT, and PT.

- CSWIP 3.2 or AWS-CWI or another acceptable equivalent (approved by COMPANY).
- Having a total experience of min. 15 years in the Oil & Gas Projects.
- Strong experience in welding, NDT, and coating / painting.
- Strong supervisory, coordination, and reporting skills.
- Fluent English lingual skills.

QC Engineer

- Bachelor of mechanical or metallurgical engineering, or other relevant engineering degree.
- ISO 9001 Internal Auditor.
- ASNT Level II in RT, UT, MT, and PT.
- CSWIP 3.1 or AWS-CWI or another acceptable equivalent (approved by COMPANY).
- Having a total experience of min. 8 years as QC Engineer in the Oil & Gas Projects.
- Hands on experience in welding, NDT, and coating / painting.
- Good command in Project Quality auditing.
- Strong coordination and reporting skills.
- Fluent English lingual skills.

Sr. QA Engineer / QA Engineer

- Bachelor of engineering in a relevant discipline.
- Certified and registered IRCA Lead Auditor in ISO 9001
- Having a total experience of min. 12 years as QA Engineer with strong background of the Oil & Gas Projects environment.
- Strong knowledge and experience in leading Project Quality audits.
- Strong coordination and reporting skills.
- Fluent English lingual skills.

Welding Engineer

- Bachelor of mechanical or metallurgical engineering with Masters' Degree in welding.
- Alternatively, Bachelor of mechanical or metallurgical engineering with Professional certification in welding engineering (IWE, CWE, or another acceptable equivalent (approved by COMPANY)).
- ASNT Level II in RT, UT, MT, and PT.
- Having a total experience of min. 12 years in welding related activities within the Oil & Gas Project environment.
- Fluent English lingual skills.

Welding Inspector

- Having a total experience of min. 5 years in the Oil & Gas industry (construction and source inspection).
- Engineering Diploma in a relevant discipline.
- CSWIP 3.1 or AWS-CWI or another acceptable equivalent (approved by COMPANY).
- Good English lingual skills.

Sr. Coating / Painting Inspector

- Having a total experience of min. 10 years in the Oil & Gas industry (construction and source inspection).
- Engineering Diploma in a relevant discipline.
- NACE Level II or CSWIP / BGAS Grade 2, or another acceptable equivalent (approved by COMPANY).
- Good English lingual skills.

Coating / Painting Inspector

- Having a total experience of min. 5 years in the Oil & Gas industry (construction and source inspection).
- Engineering Diploma in a relevant discipline.
- NACE Level I / II or CSWIP / BGAS Grade 1 / 2, or another acceptable equivalent (approved by COMPANY).
- Good English lingual skills.

Vendor Inspectors

- Having a total relevant experience of min. 5 years in the Oil & Gas industry (Vendor / source inspection).
- Engineering Diploma in a relevant discipline.
- Familiar with Shell DEP's and international codes & standards.
- Professional qualification / certification in the relevant discipline (welding, coating, painting, NDT, …etc.).
- QA/QC Inspectors (GRE /GRP, Piping, Pressure Vessels, Tanks, Civil, Electrical / Instrumentation, Cathodic protection … etc.) Having a total experience of min. 5 years in the Oil & Gas industry (construction and source inspection).
- Engineering Diploma in a relevant discipline.
- Certified to the related discipline in Quality.
- Good English lingual skills.

NDT Technicians

- Radiographer shall be certified to ASNT or CSWIP / PCN level II with 3 years' experience after certification, relevant to Oil & Gas projects.
- RT film interpreter shall be certified to ASNT ACCP level III, or CSWIP / PCN level II in RT with 5 years' experience after certification, relevant to Oil & Gas projects.

- Ultrasonic testing technician shall be certified to CSWIP / PCN level II certification with 5 years' experience after certification, relevant to Oil & Gas projects.
- Other technicians shall have ASNT or CSWIP / PCN level II certification with min. 5years of relevant experience in Oil & Gas industry
- Alternative equivalent qualifications may also be acceptable, subject to COMPANY approval.

Discipline Inspector - AUT/PAUT/TOFD

- Hold a Degree/Diploma in Engineering or an approved equivalent.
- Shall be qualified in accordance with TWI CWSIP ISO 9712 Level-II for AUT Inspector.
- Shall be qualified in accordance with BINDT/PCN ISO 9712 Level-II for PAUT / TOFD Inspector.
- Shall have prior experience in the relevant method and shall have worked in 3 prior projects in similar capacity.

Underwater Inspector

Qualified in accordance with CSWIP 3.1U or an approved equivalent with Minimum 5 years (2 years related to Upstream or downstream Oil and Gas Industry) in the 3.1 U abilities and in addition be able to apply underwater magnetic particle inspection techniques and A scan techniques using compression wave probes visual inspection of underwater structures, use of camera both still film and CCTV, measurement of cathodic potentials and the use of ultrasonic digital thickness meters.

ROV Inspector:

This inspector is an above water member of the inspection team Qualified to CSWIP 3.3U or approved equivalent Minimum 5 years' experience (3 years related to oil or petrochemical industry) in the techniques included in the (CSWIP 3.1U) requirements, recording and processing data, use of communications systems, have a knowledge of QA relevant to underwater inspection and of remotely applied inspection system.

Under Water Inspection Controller

Qualified to CSWIP 3.4U or an approved equivalent Minimum 5 years' experience (3 years related to Oil or petrochemical industry) in all aspects of the 3.3U ROV in addition to the techniques included in 3.2U requirements. Also have acknowledge of diving systems, capabilities and limitations of ROV's and an understanding of inspection planning and briefing.

PERSONNEL APPROVAL

- All contractors' quality personnel shall be approved by ADNOC prior to any engagement in ADNOC projects.

- Contractor quality personnel shall have adequate experience and qualification to carry out the required tasks professionally. It is the responsibility of the Contractor to verify and validate their competencies/qualifications prior submitting their CVs for ADNOC review and approval.
- Assessment/ interview records by the contractor for the proposed candidates shall be submitted to ADNOC along with the CV and qualifications certificates.
- COMPANY has the right to interview any of the Contractor personnel either via telephone or face-to-face or both and to conduct written test, to verify their competency. ADNOC has the right to reject any proposed personnel without the need for indicating the reasons, in which case the Contractor shall propose another candidate for review and approval by ADNOC in a timely manner without affecting the Project schedule.

APPENDIX (K): INSEPCTION AND TEST PLAN

	INSPECTION AND TEST PLAN									
DOCUMENT NO		Rev. #	QA Level:	DOCUMENT TITLE			Page			
			Insp. Level -				Document Class:			
SR. #	Description of activity	Reference Documents	Type of Check	Acceptance Criteria	Verification Documents / Record	Surveillance Points (*)			Remarks	
						CONT/ VEND OR	TPIA	COMP		

Legends: **A** - Approval; **W** – Witness-(100%): **W1** – Witness-(10%): **H** – Hold; **R** – Review; **S** – Surveillance