

QA / QC MANUAL

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“Quality is fitness for the purpose.”

Reliability is the ability to continue to function to our accepted quality standard.”

PLEDGE:

OES delegates the necessary responsibilities with authority and organisational freedom to all its members under independent departments performing QA/QC functions to ensure high quality standards and identify quality related problems and to initiate, recommend and provide solutions to maintain Quality Standard.

MOTTO:

Establish and maintain the right level of the Quality Standard for all the activities which may influence the quality of the services and production rendered by OES and that quality will be planned and built into a product/service, and verified by means of review, inspection and testing, to satisfy the customer.

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CHAPTER - 1

QUALITY ASSURANCE PROGRAMME

In matters affecting quality Control, a Quality Control team shall carry out all aspects of inspection as specified by the Quality Assurance Engineer, which would meet the specification and implied requirements of the customer.

*This manual shall be the **Bible** for quality of all the activities of the Company. This Manual is essentially set to meet the requirements of ISO 9000.*

No deviations from the methods set forth herein are permitted, unless clearly authorized by the quality Assurance Engineer or the appropriate authority o OES. Conflicts arising between Quality Assurance Engineer and other departments in matters affecting Quality are resolved by the appropriate authority without negating the requirements of the standards.

1.1 The Quality Assurance is divided into three parts :

- QA Manual (Part 1)
- QA/QC Procedures (Part 2)
- Instructions (Part 3)

Each Division/ Department head in the OES is responsible for ensuring that the perso

nnel in his section are familiar with the QA program and that his Division/ Department complies with applicable procedures.

CHAPTER – 2

QA MANUAL

QA Manual is the overall document of the QA system that describes the Quality requirement and their principal accomplishment.

2.1 Manual Control

This manual shall not be revised to meet client's specifications. All additional requirements imposed by the client shall be covered in the QC plan for that particular project.

Distribution of QA Manual may be done as follows: -

- ***Controlled QA Manual***

This Manual shall be distributed to individuals and departments within OES for direct use in their work. Such copies shall be subject to automatic revisions.

- ***Uncontrolled QA Manual***

This Manual shall in its current status, be distributed to individuals/ organisations outside OES for information and review and will not be revised.

Request for changes and revisions to be directed to Quality Assurance Department.

No changes will be made without approval of the management of OES and the Quality Assurance Department.

Changes shall be indicated giving all pages of the chapter and a new revision no. and date in the title block. Revised chapters / pages will be distributed to the holders of the controlled QA Manuals, who shall be responsible for exchanging the chapters in the QA Manuals.

CHAPTER – 3

QA / QC PROCEDURES

QA/QC procedures as part 2 comprise of general and functional procedures.

3.1.1 QA general procedures are needed to control administration of the Quality Assurance activities within OES.

- Document preparation, review, distribution and control.
- Record retention
- Non conformity records
- Quality Audit & Management review

The above general procedures, which are required routinely in each division / Department are described briefly as below:

3.1.2 Document preparation, Review, Distribution and Control:

These procedures provide the guidelines for preparation, Review, distribution of documents, drawings Specifications, procedures, correspondence handled by all the sections of the company. This also covers the documents received from and sent to clients, vendors, sub-contractors and others.

The Drawings/Documents (Specifications and procedures) shall be checked by project, engineering, operations QA/QC and safety for initial check for errors, omissions, interference and adequacy etc. comments shall be passed on to clients for possible revision / response. The revised drawings / documents approved by clients shall be distributed to the above stated departments. All the obsolete drawings shall be collected and stamped “ VOID ”/ “ SUPERCEDED ”.

The documents prepared by each department are to be checked before issue within or outside the company. The document shall have identifiable number for easy identification.

The documents generated by the company or received from outside client, vendor, sub-contractor or others shall be distributed through a nodal point, which is responsible for recording and distribution of the documents. Every department is responsible for safe keeping of the generated document and received documents.

QA / QC PROCEDURES - Contd.

The projects shall be solely responsible for maintaining the copies issued to various departments.

The projects shall issue to the fabrication department details of cutting lists, templates and shop fabrication drawings generated by the engineering department. The QA/QC personnel shall liaise with the project, engineering, fabrication, and operation for NDT, fabrication documentation and weld plans.

After fabrication, all construction drawings shall be updated and stamped "as-built".

All documents pertaining to the project shall be handled by the project engineer and transmitted to engineering, fabrication and QC personnel as required. Records of revision in the fabrication procedures shall be maintained by the project engineer. All revisions shall be dully notified to the relevant personnel.

3.1.2 Record Retention:

This section provides guidelines for retention of documentation completed / received after completion of the activity and maintaining the records for future reference.

On completion of the job / project, copies of all reports, records and documentation shall be submitted to the client. The final documentation shall contain:

- *Design Specification and Calculations*
- *Drawings*
- *QC Plan*
- *NDT & Heat Treatment procedures*
- *Welding procedure records*
- *Welding operators records*
- *Test certificates for materials and others*
- *NDT Reports*
- *Hydro test Records and Reports*
- *As-Built Drawings*
- *Spare parts details*
- *Operation & Maintenance Manuals*
- *Any other documents/ records related.*

QA / QC PROCEDURES - Contd.

Company shall keep all correspondence, documentation for a period as specified/requested by client. After this retention period, the client shall be notified of disposal of any documents. Important and essential documents are retained and safeguarded.

3.1.3 Non-Conformity Records :

Non-conformity is any condition of document, material or workmanship, which does not comply with the governing code or specification or requirement and requires correction or elimination for acceptance.

Some of the examples for controlling the non-conformity are as follows:

Material not conforming to the requirement and cannot be rectified shall be removed from location with an appropriate identification record shall be made of the defective material rejected.

If the non-conformity falls within framework of an approved procedure for rectification of the conditions, the fabrication shall rectify the condition strictly as per the procedure, subject to the approval of the concerned authority from the client.

3.1.4 Quality Audit and Management Review:

This section provides guidelines for ensuring that all the departments of the company shall strictly follow the Quality procedures in order to maintain the high quality expected in the output.

Quality audit for any particular activity is carried out by a team, headed by appropriate authority from QA/QC department. The team shall be aware of the operations of the department being audited. The audited department shall cooperate with the team.

A joint review meeting is held by the head of QA/QC department, relevant department heads and the appropriate authority from the management. Any corrective actions for non-conformity shall be prescribed. Any changes or updating of quality measures/procedures if required is finalised and the same are incorporated in the quality manual with approval from the appropriate authority.

QA / QC PROCEDURES - Contd.

3.2 QA/QC FUNCTIONAL PROCEDURES

These comprise of procedures, which describes the practical accomplishment of the QA/QC requirements, related to the different activities performed:

- *Contract Review*
- *Planning & Engineering.*
- *Material Control*
- *Production Control*
 - *ON-SHORE*
 - *OFF-SHORE*
- *Inspection Program*
- *Equipment Check & Instrumentation Calibration*
- *Vendor & Contracts Evaluation.*

3.2.1 CONTRACT REVIEW :

This procedure outlines briefly the activities to be carried out by various departments for review of the contract

During the bid review stage, the client's drawings, documents, and other specifications and requirements are reviewed thoroughly for any errors, omissions, contradictions, adequacy and sensibility.

Bidding section shall confer with projects, engineering, fabrications, operations, QA, safety and other relevant departments in finalising the tender proposal and its meeting with various requirements of the client .Any ambiguity or inadequacy in the design and contractual documents shall be clarified with the client and documents.

3.2.2. PLANNING & ENGINEERING

This procedure describes the requirements to be followed for planning and engineering during the bidding stage as well as project execution stage.

A planned schedule is prepared during the bidding stage with all the activities required for complete scope of work as per tender information mile stones set by client.

QA / QC PROCEDURES - Contd.

A comprehensive program with the help of Bar Charts/CPM/PERT TECHNIQUES with project key dates are prepared and enclosed in company proposal as per tender requirement engineering section reviews the tender document or the technical scope of work, specifications, procedures, drawings for various activities.

After award of the contract, the planning and engineering activities are revised/modified/updated to suit the requirement of the contract. Detail procedures, Bill of Materials, Scope of work with all activities is laid down.

Certain guidelines are to be followed for the above activities. These are summarized as follows:

- The Engineering Personnel shall prepare all drawings and documents (planning, package, calculations, analysis, specifications, procedures, reports etc.) files under separate names & numbers, assigned as per established procedure and norms.*
- These shall be issued to tender section of the Project as the case may be for review and onward transmission to client.*
- After the documents /drawings are approved by the client /clients representative as per requirement, the engineering shall record the approved and issue for distribution, these documents to all relevant sections by the projects.*
- The engineering personnel shall maintain a logging record off all these copies made for distribution to various sections.*
- The project shall distribute the required number of copies of the approved drawings/document to relevant sections.*
- Project shall maintain a strict record of number of copies distributed and a list of personnel, copies were distributed to along with track record of revisions made and issued.*
- Based on the client approved drawings /document the engineering shall raise the bill of materials along with detail specifications, inspections/testing equipments as per contract requirements and inputs from fabrication, QA and operation.*

QA / QC PROCEDURES - Contd.

- *The bill of materials shall specify the quantity, size and condition in which the material shall be used for fabrication. In case material is not provided by the clients or is not available, the requisition are raised for procurement.*
- *All incoming materials shall include relevant conformance certificate, indicating the as-received condition, and expected properties after completion of fabrication. This includes both the purchased materials as well as the client supplied material.*
- *Details of additional testing or requirements shall be clearly specified in the purchase requisition, by the engineering.*
- *During the course of fabrication, if the material is to undergo any welding or heat treatment, the engineering shall indicate the details.*
- *If the fabrication involves qualifying new welding procedure and welder's Procedures and welders performance qualification, the Bill of Material shall include material required for the same. QA/QC shall review these procedures & release for client approval.*
- *Conformance certificate shall be verified by the project / fabrication / QA Engineers, prior to acceptance of the material.*
- *Once the material is received, the material controller takes charge of all material during entire fabrication and subsequent activities.*
- *If the project involves fabrication/execution at site, (onshore or offshore) the project & engineering personnel along with the relevant personnel shall conduct a site survey, prior to bid as well as before fabrication of assemblies to be installed on site. Based on the site –survey input to be incorporated in the fabrication drawings to engineering.*

3.2.3. Material Control

This is the procedure for verification of receiving, quantity, storage and traceability of material in use.

Engineering department will prepare the bill of materials, identify the scope of supply of materials by client and OES and send to projects/stores for verifying if any material with required specification available in stock with relevant certificates.

Available materials shall be issued by stores on requisition and for remaining materials as approved by the engineering department shall be forwarded to purchase department.

Purchase department shall raise enquiries, get quotations, and do necessary technical / commercial evaluation shall issue local purchase order duly authorised by project. Before placing the order it is to be ensured that the material and its documentation meet the job specifications and the delivery meets the project schedule.

Receiving of Material

- *Receiving ,inspection and storage of material shall be handled by the material controller(MC)*
- *MC shall check the delivery notes against the requisition and confirm that quantity supplied is in accordance with the requisition.*
- *MC shall ensure that relevant mill/test certificate are attached. Projects shall arrange for mill certificates from the client-supplied material.*
- *MC shall check that the markings on the material are genuine and comply with mill/test certificates and material specifications*
- *MC shall ensure that the material satisfies the specification as per the requirements of the customer/client.*

QA / QC PROCEDURES - Contd.

Inspection and Acceptance of Material

Mills/test certificates shall be verified against the marking on material.

Thickness and other dimensions shall be checked to ensure that they comply with the specifications and are within the tolerance limits.

Plate Inspection

Visual inspection shall be conducted to examine for indications of corrosion, pitting, surface laminations and damage during handling etc.

Pipe Inspection

Visual inspection shall be conducted to examine externally and if possible internally for indications of pitting, surface laminations, mechanical damage etc.

Structural Sections

Visual inspection shall be conducted for corrosion, pitting, surface laminations dimensional tolerances etc. Visual inspection shall also incorporate measures to ensure that the flanges are at right angles to the web.

Fittings (Flanges, Elbows, Tees etc.) Inspection

Visual inspection shall be conducted to check for indications of corrosion, pitting, manufacturing defects, mating face distortions etc.

Valve Inspection

Visual Inspection shall be conducted to check for corrosion, pitting and manufacturing defects etc.

Welding Consumable Inspection

Consumable inspection shall be conducted to ensure that all welding consumables meet the specifications and classifications as described on approved welding procedures. Consumables in unsealed or damaged containers shall be rejected. Material Controller shall accept only those materials approved by the QC Personnel and enter into the inventory. Only accepted material shall be issued for fabrication.

QA / QC PROCEDURES - Contd.

In case of defect in supplied items, the QC personnel shall make a defective material report and forward to the projects through the QA Engineers. Standard format shall be used to report defective materials.

Materials with equivalent specifications may be used subject to the approval of the projects/ Engineering / QA / QC and the client. Supplementary test reports or certificates of compliance if required, shall be submitted to the clients to support the equivalent material.

Storage of Materials

Material, equipment's, packages etc. susceptible to environmental damages and deterioration shall be protected from any kind of damage.

Flanges, bolts, gaskets, valves etc. shall be stored in the covered areas.

Bulk material like steel sections, plates, pipes etc. can be stored in the open on timber bearers.

Material is systematically arranged for easy identification.

Marking of Material

All material shall be marked with marker or hard stamped for identification of applicable material specification and heat number.

Sectioning of material shall be done with each section duly identified prior to sectioning.

Process pipeline spools shall be marked with line and spool numbers hard stamped on metal tags and tied around individual spools with wire.

Material Traceability

Each section of the material shall be marked and identified in accordance with the documents at the time of acceptance. Such markings shall be properly maintained during storage for traceability.

QA / QC PROCEDURES - Contd.

3.2.4. Production Control Onshore :

Scope :

This section describes the procedures, to be followed for onshore construction for production control in translation of the raw material into a finished product including fabrication, documentation etc.

Production Planning & Execution:

Material Controller shall make available all materials required for the necessary operations according to the material take-off list, as requested by the site and directed by the Engineering.

The site manager and the project / engineering department shall first review the working drawings to determine the sequence and method of fabrication. A detail job route sheet is developed. Copies of the Job Route Sheet and QC plan Shall be available with the site, QA/QC, Foreman`s and the project.

The drawings and documents are delivered to the site for the operations to be started.

Site Supervisors / Foreman is responsible to ensure the correct usage of material or equipment while operation. The combination of the work shall be in accordance with the JRS. The QC shall work in parallel to ensure the quality with respect to the specifications as per the drawings and calculations.

The welding / Fabrication activities shall be notified of all major discrepancies. They shall be handed as per procedure for non-conformity.

Welding and fabrication inspection shall be handled by the QC personnel after completion of the same, as per procedures for examination and inspection.

The site supervisor/foreman after completion of the welding and fabrication shall rise requisition to the QC personnel to conduct the Non-destructive examination of the components as per QC plan.

QA / QC PROCEDURES - Contd.

After completion of the inspection, the components shall be dispatched/permited for further operation if any.

In case of any defects observed the same shall be documented and reported. Repairing or reworking done accordingly to comply with the specifications given by the client.

Documentation

- *All the documents pertaining to the release of the component shall be prepared and signed by the project engineering supported by the QA department.*
- *As built drawings are prepared by engineering/project based on the records supplied by fabrication supervisor/foreman and QC personnel.*
- *Consolidated inspection record for the project shall be compiled by the QA Engineer and submitted to projects.*
- *The projects shall ensure that all documentation is completed in due course and made available to the client after the completion of the project.*

Responsibility

- *It shall be the responsibility of the projects to ensure that the various members of the line management are fully conversant with the relevant drawings and specifications that govern the project.*
- *It shall be the responsibility of QC personnel to ensure the quality control plan is adhered to during the entire course of the project.*
- *Site foreman/supervisor shall be responsible for the progress of the fabrication.*

3.2.5 OFFSHORE CONSTRUCTION

Scope:

This section details procedures involved for offshore projects. Section 3.2.4 is applicable for all the activities of these offshore projects, which are carried out in the fabrication site of the company.

The following are the guidelines and requirements to be adhered for overall works to be carried out:

QA / QC PROCEDURES - Contd.

Planning & Execution:

The projects, engineering & offshore operations review the working drawings to determine the scope, sequence & method of fabrication at yard and erection at site. QA

Engineer confers with projects on welding sequence & processes required at the yard as well as at offshore site. A QC plan is prepared & documented by the QA engineer. Copies of production & QC plan are distributed to QA engineer. Project and job foreman, in yard as well as site foreman.

As per material take off list, the material controller makes available all materials as requested for by the yard & the barge.

Barge foreman is responsible to ensure material used as per working drawings. Bevelled ends shall be cleaned prior to welding.

Barge fitter/fabrication foreman should ensure that the fits up of components are in accordance to the applicable working drawings before releasing components for welding. Also QC personnel shall have to ensure compliance of components to working drawings in all respect.

Barge welding foreman shall supervise the welding activities. He is responsible for assigning the right welders, welding operators & welding procedures for the relevant procedure.

After completion of welding & fabrication, barge based QC to conduct NDE. After inspection the component shall be despatched for further operations with a material identification list.

If queries regarding fabrication is not clarified at site, same shall be sent to base office.

In case if the project is related to the hook-up then the project department should ensure the pre-fabricated and after fabrication documents be received for the records and reference from the client. Any queries can be passed to the client for clarification before the next step for planning starts.

QA / QC PROCEDURES - Contd.

Documentation:

All documents pertaining to the release of the components shall be prepared & signed by QA.

As-built drawings are prepared by engineering at base, based on the records supplied by QA/QC from barge.

A consolidated inspection record for the project shall be compiled by the QA engineer and submitted to the projects.

The projects shall be responsible for maintenance of all documents and submission of documents to the client at the end of the project.

Responsibility

For every project, it shall be the responsibility of the projects to ensure that the various members of the line management are fully conversant with the relevant drawings and specifications that govern the projects.

It shall be the responsibility of the QA section to establish the quality control for the project.

It shall be the responsibility of the QC personnel to ensure that during the entire course of the project the quality control plan is adhered to.

Barge Foreman shall be responsible for the progress of the fabrication, erection & installation at site. However, QC personnel shall ensure that the component is cleared after inspection for further operation.

Quality Assurance Engineer shall monitor the performance quality of the works carried out at site and of QC personnel.

QA / QC PROCEDURES - Contd.

3.2.6 INSPECTION PROGRAMME

This section outlines the procedures to be followed by the quality control personnel during the course of fabrication, erection and installation in fabrication yard or on the site in ensuring the conformity to the quality plan.

Quality plan for the particular project shall be laid down and documented.

This shall be prepared by the QA/QC section, on the basis of the input supplied by the project.

The personnel involved in quality control activities:

- *Shall be suitably qualified to execute the responsibilities entrusted upon him.*
- *Shall be supplied with suitable instruments to execute this work.*
- *Shall be properly informed of his scope of work as related to the particular job. Information pertaining to a job may reach him either through the project, barge/fabrication superintendents. QA engineer or his immediate supervisor.*

The QC plan shall form the basis for the inspection program for the project. Any deviation from the QC plan shall obtain approval from the QA/QC section and the client's representatives, if required.

- *non-destructive examination shall be carried out in line with QC procedure under:*
- *QC personnel shall compile a consolidated report for the stage wise inspection conducted on the job with the reports approved by the client/client's representative. After approval all original documents and graphs are retained in archive and copies submitted to the client.*

QA / QC PROCEDURES - Contd.

3.2.7. EQUIPMENT CHECKS & INSTRUMENT CALIBRATION

This section outlines the procedures to be followed by equipment checks and calibration of the instruments used in quality control.

Measuring instrument and equipment shall be tested and calibrated by using a standard reference. Typical measuring instruments & equipment shall include

- *Pressure Gauges*
- *Load Cells*
- *Ammeters / Volt Meters / Ampere meters*
- *Recorder Units*
- *Ultrasonic Testing Equipment*
- *Theodolite & Level Instruments*
- *Welding Machine*

It is the responsibility of the foreman handling the project to get equipment's checked for their required performance and the instruments calibrated.

Calibration of instruments may be conducted by a recognized testing agency. The agency shall issue certificates of calibration. The certificates shall contain details of the instruments, model, serial number, calibration, reference used for calibration, and date of calibration.

Records of inspection/check/test of the equipment's and calibration certificate shall be maintained by QA. QC personnel shall ensure proper functioning of the equipments/instruments, and validity of calibration. Records shall be available for client's review.

Measuring tapes and level gauges shall be visually inspected for damage and checked using a known reference.

3.2.8 VENDOR /SUB-CONTRACTOR EVALUATION

This section describes the procedure to inspect and evaluate vendor/sub-contractor for the supply of materials, equipments or render services as a part of the project work.

QA / QC PROCEDURES - Contd.

Evaluation shall be conducted prior to the award of contract. This procedure enables the vendor/sub-contractor to provide services suitable to the work/specification supplied by the company.

Sub Contracting:

The evaluation shall be conducted by a team consisting of QA/QC, projects and engineering, thorough inspection of the sub contractor's premises and facilities is done to ensure the suitability of equipment, manpower and other facilities they have. The team should ensure that the work force/personnel involved in carrying out the sub contract work is suitably qualified. Documental evidence to be taken and if necessary may individually interviews the personnel. The team shall ensure that the equipments used are up to the reasonable standards of serviceability for the work.

The team shall review the quality control program, storage facilities and any others. After completion of the defined work, the project shall receive the documentation accompanying the service rendered.

Material Supplier

The team shall carryout a detail inspection of the supplier facilities to ensure that materials supplied for a particular project meet the specifications as detailed by the engineering, and all the certificates pertaining to the quality of the material is made available prior to delivery.

All materials shall have relevant information pertaining to identification, grade place of magnification, size, specifications, schedules heat numbers colour coding and other necessary required information as specified. The information shall be stamped or printed on suitable location.

The material controller shall ensure that the material supplied have correct documentation and all in accordance with the specifications QC should ensure that subcontractor adheres to all check points to maintain the required level of quality for the services / products rendered.

CHAPTER - 4

QUALITY CONTROL

SCOPE:

This section describes methods and requirements for Quality Control. The purpose of QC is to check for complying of requirements, and to identify non-conformance and to ensure quality is achieved as per specifications and requirements.

The different method for achieving the quality for different operations shall be as explained below:

4.1 Visual Inspection of Structural Steel and Piping

Personnel performing visual inspection shall have available all relevant codes and documents pertaining to the work, such as applicable codes, specifications, welding procedures etc. It is the responsibility of each inspector to ensure that the inspection is performed in accordance with applicable codes, specifications and procedures.

The inspectors have the authority to stop work, which is not carried out to the standards of relevant codes and specifications. The extent of the inspection required is generally governed by contract requirements. However this does not limit the inspector's responsibility and he shall attend and/or inspect all operations and completed work as necessary to ensure specified quality.

Visual inspection can be divided into three main stages, i.e. preventive inspection, follow-up inspection and final inspection. All structural steel, piping material, welding repairs included, is subjected to inspection in all three stages.

Upon visual acceptance of the welding it is the QC inspector's responsibility to schedule and initiate the required.

Non-Destructive Examinations. The "Request for NDE" prepared by the QC inspector may serve as a visual inspection release.

When reporting before and during welding, the inspector determines the extent of is report by his own judgement. Deviations, which might affect product quality, shall be reported. This shall be done in writing to the Inspection Engineer with copy to the production supervisor.

Reporting after final inspection shall provide a record of the structures and items that have been inspected and approved. In case of non-approval, a punch list shall be compiled including all remarks concerning unsatisfactory or unfinished work.

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QUALITY CONTROL - Contd.

4.2 Non-Destructive Examinations (NDE)

It is the Inspection Engineer's responsibility to ensure that

- a. *NDE is carried out by adequately qualified personnel.*
- b. *Necessary NDE procedure is prepared in accordance with applicable codes and standards and the contract requirements.*
- c. *NDE is performed according to approved procedures.*
- d. *NDE results are recorded and reported on approved report forms.*
- e. *A complete history and tractability record is prepared.*

The method of examination to be used will be as specified in the production documents in compliance with contract requirements. Normally the following examination methods are used:

- *Radiographic Testing (RT)*
- *Ultrasonic Testing (UT)*
- *Magnetic Particle Inspection (MPI)*
- *Liquid Dye-Penetrant Examination (DP)*

Other methods may be applied as found appropriate by the QA Engineer and clients representative.

Radiographic Testing Procedure:

The RT procedure will describe the method to be used for radiographic testing specifying:

- *Material type and thickness range*
- *Technique , i.e. single wall, double wall, panoramic*
- *Source of radiation and strength of source*
- *Maximum source-to-film distance*
- *Film brand and type*
- *Screens to be used*
- *Processing*
- *Identifying marking of films*
- *Reporting RT results*
- *Acceptance criteria*

Ultrasonic Testing Procedure:

The UT procedures shall cover the following:

- *Weld geometry, weld type and type of material*
- *The surfaces from which examination shall be carried out*
- *Surface conditions and type of couplant.*

QUALITY CONTROL - Contd.

- Scanning technique
- Probe types, frequencies and transducer sizes
- Type of ultrasonic instrument
- Description of calibration
- Sensitivity level and acceptance criteria
- Limitations of examination
- Method and extent of reporting
- Acceptance criteria

Magnetic Particle Inspection Procedure:

The MPI procedures shall cover the following :

- Materials, shapes sizes to be examined
- Magnetization technique
- Equipment to be used for magnetization
- Surface preparations, finishing, cleaning
- Type of ferromagnetic particles to be used, manufacturer, color, wet or dry etc.
- Magnetization currents
- Demagnetization
- Extent of examination
- Method of extent of reporting
- Acceptance criteria

Liquid Dye-Penetrant Examination Procedure:

The DP procedures shall cover the following:

- Materials, shapes and sizes to be examined, and the extent of examination
- Type of penetrant, penetrant, remover, emulsifier and developer
- Cleaning materials used and time allowed for drying
- Dwell time and temperature of surface and penetrant during examination
- Removal of excess penetrant and drying of surface before applying developer
- Developing time before interpretation
- Post-examination cleaning
- Method and extent of reporting
- Acceptance criteria

4.3 Leak Testing / Hydrostatic Testing

Leak testing and hydrostatic testing of tanks, vessels and piping systems will be performed according to written procedures, and in compliance with code requirements and contract specifications. The test system will be blinded and two calibrated pressure gauges will be fitted.

QUALITY CONTROL - Contd.

Normally water containing corrosion inhibitor, oxygen scavenger and brocade if specified, will be used for testing. When all air pockets are vented, the pressure will be raised slowly up to the design pressure and all joints/connections will be inspected for leaks. Correction of any leakage will be carried out and the pressure then raised to full hydrostatic test pressure, which shall be maintained for a period, specified in the test procedure. A visual inspection of all joints will be performed. There should be no drop of pressure during testing. Temperature of the test media will be recorded during the test and will be compared with the pressure readings.

If the test is found acceptable the pressure test report and other test documents will be signed and approved by the QA/QC and client's representative.

4.4 Inspection of Surface Treatment

Inspection of surface treatment will be carried out according to written procedures, covering all surface treatment processes.

It is the responsibility of the Engineer/Foreman in charge to ensure that the work is carried out according to the valid procedures, that equipment and consumables for surface preparation and coating are used and stored as prescribed, and that the test logs stated in the procedures are correctly maintained.

The Plant Inspector will ensure that approved procedures and specifications are adhered to, by performing regular and random inspections. He is responsible for reporting of the work.

The QAD is responsible for systematic filing of all reports point lists and releases to be part of the final documentation.

4.5 Dimensional Control

The extent of dimensional control will be established by QA according to contract requirements. QA is responsible for preparing the necessary instructions and sketches, which will be subject to client's approval.

Generally the Project Engineer in charge, is responsible for adequate dimensional control and for ensuring that piping or structural items are assembled within specified tolerance.

CHAPTER - 5
DETAIL INSTRUCTIONS

5.1 *Detail instructions as part 3 are made for each activity of the company and describe in detail, how OES will comply with quality assurance requirements of customers / contracts / order, Design specification, Drawings, Processes, Fabrication, Inspection, Tests and Documentation by records, from the acceptance of contract/order to final approval by client's / customers / authorities.*

Note: *These procedures may be amended for a particular project to satisfy the specific requirements of the project with proper permission from the management and QA department.*

Assigning the authority with responsibility and accountability, allowing for perfect involvement in the job to achieve the objectives by informing before hand the process and limitations gives the way for the Quality and Reliability.

For any clarifications please contact the QA/QC department.