QUALITY ASSURANCE / QUALITY CONTROL PLAN

ATS-QA/QC-PLAN
ACL-PQP-02/01

Rev.	Date		ATS	Contr.	Client
01		**For presentation**			

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CONSTRUCTION QUALITY ASSURANCE / QUALITY COTROL PLAN

One of the main priorities of ***AKKILA COMPANY LIMITED*** is to maintain high quality of the works and to improve continuously the Quality System. The present manual covers all construction quality assurance and quality control procedures, practices and documentation, as follows:

1. Preparation and updating of Construction QA/QC plan including:

   - Description of procedures and standard practices,
   - QA/QC responsibility matrices and document flow,
   - Inspection report forms,

2. Preparation and qualification of welding procedures.
3. Qualification of welders.
4. Field quality control, including:

   - Traceability during fabrication and erection works,
   - Control of compliance with relevant procedures,
   - Visual inspection,
   - Radiographic inspection,
   - Ultrasonic inspection,
   - Magnetic particle inspection,
   - Liquid penetrant inspection,
   - Preparation of welding books and welding inspection reports,
   - Supervision of pipeline/flow line pigging and gauging,
   - Supervision of hydrostatic testing,
   - Completion of the documentation,

PROCEDURES AND STANDARD PRACTICES

In order to provide the assurance of the quality, the following procedures and standard practices are applied:

- Standard practice for visual examination,
- Standard practice for radiography,
- Standard practice for liquid penetration examination,
- Standard practice for magnetic particle inspection,
- Standard practice for ultrasonic testing,
- Standard practice for bending,

- Hydrotesting procedure,
- Standard practice for surface preparation and painting inspection
- Standard practice for tank and vessel cleaning;
- Standard practice for lowering pipe into trench, trench padding and backfilling,
- Standard practice for tank construction & erection
- Welding procedures,

All these documents are based on the applicable codes and standards, such as ASME Section V, ASME Section VIII, ASME Section IX, ANSI/ASME B31.3, B31.4, B31.8, API Standard 1104, etc., as well as on the schedules and specifications of Client.

The procedures and standard practices are included in Part I of the Construction QA/QC plan.

RESPONSIBILITY MATRICES AND DOCUMENT FLOW

The responsibility matrices and document flow tables are included in Part II of the Plan.
They are the following:

- Pipeline / flowline Responsibility Matrix and Document Flow.

The Responsibility Matrix **(Mat 01-PL)** shows the responsibilities of the QA/QC staff, pipeline engineers, foremen, and material men in the quality control process during all stages of construction, namely: Right of way, Stringing, Bending, Trenching, Welding NDT/NDE, Coating, Lowering-in, Backfilling, Hydrostatic testing, Reinstatement.

The Document Flow Table **(Doc 01-PL)** shows the way of preparation, signing, and distribution of the QA/QC documents, related to the process, namely: visual, dye-pen and radiographic inspection reports, trench inspection, joint insulation, lowering and backfilling reports, report for welding defects, orders for repair, pigging and hydrotesting reports.

- In-plant piping Responsibility Matrix and Document Flow.

The Responsibility Matrix **(Mat 02-in)** shows the responsibility of the QA/QC staff, piping engineers, foremen, and material men in the quality control process during all in-plant piping fabrication and erection, namely: sorting of materials (material dedication), preparation for prefabrication, welding, NDT/NDE sandblasting, painting, erection (incl. Field welding), hydrostatic testing and reinstatement.

The Document Flow Table **(Doc 02-in)** shows the way of preparation, signing and distribution of the following documents related to prefabrication and erection of the plant piping: visual, dye- pen. and radiographic reports, coating reports, progress reports, welding inspection reports, hydrotesting reports.

REPORT FORMS

The report forms are included in Part III of the plan, divided into 5 topics:

- Welding, NDT, Hydrotest.
- Pipeline / Flowing / In-Plant.
- Mechanical.
- Civil.
- Instrumentation.

The forms were prepared on the grounds of the recommendations given by related codes and standards, and in compliance with the good field practice.

PREPARATION AND QUALIFICATION OF WELDING PROCEDURES

The preparation and qualification of the welding procedures is carried out by Welding /NDE (Non-Destructive Evaluation) Group (see fig.1) in accordance with the requirements of ASME IX, API Standard 1104, ANSI/ASME B31.3, B31.4, B31.8, AWS D1.1, etc.

There are 10 welding procedures covering most of the pipeline and in-plant piping construction activities. These procedures are prepared by ***AKKILA COMPANY LIMITED*** QA/QC engineers and qualified under the supervision of ***RWTUV***. They are included in Part I of the Plan.

Any further qualification of a procedure that may appear necessary for a job will be prepared by experienced welding engineers and submitted to the Client for approval. After being approved by the Client, the procedure will be carried out in the fabrication yard by experienced welders under the supervision of welding inspectors from both ***AKKILA COMPANY LIMITED*** QA/QC Department and the Client, Certified materials and consumables shall be used. The mechanical testing will take place in authorized laboratory, approved by the Client.

QUALIFICATION OF WELDERS

The welder's testing and qualification is carried out by the Welding/ NDE Group (see fig.1). The qualification of welders under the qualified welding procedures is carried out according to the requirements of ASME IX API Standard 1104, ANSI/ASME B31.3, B31.4, B31.8, AWS D1.1, etc The testing takes place in the fabrication yard under the supervision of welding inspectors from both ***AKKILA COMPANY LIMITED*** Group and the Client. Certified materials and consumables are used. Welder's Performance Test Record is prepared and signed for the successful welders. The welders are provided with ID cards for the duration of the works.

FIELD QUALITY CONTROL

The field quality control is carried out by the Field Inspection Group (see fig.1). The following activities take place:

- Preparation and updating of welding maps.
- Tracing prefabrication, blasting, priming, and painting.
- Visual inspection of welding, blasting, priming, and painting.
- Checking paint thickness.
- Monitoring work compliance with the relevant procedures.
- Checking skid assembly.
- Checking vessels.
- Checking rotating equipment.
- Checking earthworks.
- Concrete pour checking.
- Grouting checking.
- Checking instrument installation.
- Preparation of mechanical, civil, electrical and instrumentation checklists.

The following documents are related to the field quality control:

- Visual Inspection Report
- Workshop/Erection Welding Report
- Trench Inspection Report
- Joint Insulation Inspection Report
- Lowering and Backfilling Report

- In-plant Piping Coating Report
- Skid Assembly Report
- Vessel Inspection and Closing Report
- Rotating Equipment Report
- Mechanical Equipment Checklist
- Mechanical Completion Checklist
- Earthwork checklist
- Backfilling checklist
- Concrete Pour Checklist
- Instrument Installation Record

RADIOGRAPHY AND OTHER NON-DESTRUCTIVE METHODS

The non-destructive testing is carried out by NDT Group (see fig.1).

Appropriate NDT equipment and materials are provided:

- Gamma-ray sources,
- Films and chemicals,
- Image quality indicators,
- Viewers and pentameters,
- Photo-laboratory equipment,
- MOI equipment,
- Ultrasonic equipment,
- Dye penetration testing chemicals,
- Field hardness testing equipment (if necessary).

The evaluation of the results is performed by Welding/NDE Group (see fig.1). The staff is properly qualified. The minimum qualification required is Level II.

The following documents are related to the NDT/NDE:

- Liquid Penetration test Report
- Radiographic Examination Report
- Magnetic Particle Test Record
- Ultrasonic Test Record

PREPARATION OF WELDING BOOKS AND WELDING INSPECTION REPORTS

The welding book (W008) for the pipelines, and the welding inspection report (W005) for the in plant piping, are final documents summarizing all welding and NDT carried out. They contain welding history and reference to all reports related to the welding of a pipeline or in-plant piping element. The preparation of these documents is a continuous processes during the execution the words. The completion of such document takes place after the line or spool obtains status of "NDT clear". The welding book/welding inspection report, together with all related inspection reports, form the ***Test Package***, which is to be completed before the hydrostatic testing.

Examples are shown in part IV:

- Test package example
- Hydrotesting documentation example
- Welding book

The examples represent real cases taken from the field practice of ***AKKILA COMPANY LIMITED***.

Attachments:

- Pipeline/Flowline Responsibility Matrix
- In-Plant Piping Responsibility Matrix
- Pipeline/Flowline Document Flow
- In-Plant Piping Document Flow
- Construction QA/QC Plan Fig.01

Quality Assurance / Quality Control

PIPELINE / FLOWLINE

RESPONSIBILITY MATRIX

JOB \ Unit	Material Man	Pipeline Engineer	Foreman	QA/QC Unit
R. O. W		Complete check		Complete check
Stringing	Check truck Loads Collect Mill Certificates	Complete check		Complete check
Bending		Complete check Draw scheme For Welding Book		Gauging (Roundness check)
Trenching		Complete check Prepare L001		Complete check Issue L001
Welding	Check Consumables		Measure pipe length Write on pipes Length, pipe # Weld #	100% inspection, Issue W001 Fill in W008 Issue W010
NDT	Check Consumables			Radiography Dye Pen Evaluate Radiographs Issue W002. W003 Order repair(W017)
Coating	Check consumables Collect certificates	Complete check Prepare L002		Complete Check Issue L002
Lowering-in / Backfilling		Complete check Prepare L003		Complete check Issue L003
Test Pack Preparation				Issue W008 Collect Related documents Complete Test pack
Hydrotest		Complete Check Prepare L004		Collect Documents Issue L004 Issue W004 Complete Test pack
Reinstatement		Complete Check		Complete Check

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MAT01 – PL. xls

Quality Assurance / Quality Control

IN-PLANT PIPING

PESPONSIBILITY MATRIX

Unit / JOB	Material Man	Pipeline Engineer	Foreman	QA/QC Unit
Storage piping, fittings, flanges	Complete check Collect mill certificates			Complete check
Sort materials As per isometrics	List of discrepancies	Complete check	Check classes, Dimensions, schedules	Complete check
Preparation for Prefabrication	Issue materials As per requisitions	Check Requisitions	Issue requisitions	Schedule Preparation as Per test pack priorities
Prefabrication – fitting And tack welding		Complete check		Complete check
Welding	Complete check	Issue W011	Mark weld #, Welder #	100% visual inspection, Issue W001
NDT	Check consumables			Radiography Dye pen, Issue W002 Evaluate radiographs Issue W009 Issue W010 Order repair (W017)
Sandblasting, Priming, Painting	Check consumables Collect certificates	Complete check Prepare L005		Complete check Issue L005
Erection	All NDT Activities for field welding			
		Issue W011		Issue W009 Issue W010
Test Pack				Issue W009 Prepare W004 Collect related documents Complete pack
Hydrotest		Complete check		Complete check Issue W004 Complete Test Pack

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Reinstatement		Complete check		Complete check

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Quality Assurance / Quality Control
PIPELINE / FLOWLINE
DOCUMENT FLOW

Index	Description	Prepared by	Signed by	Copies	Distribution
W001	Visual inspection Report	QA / AC	QA / AC Client Inspector	2	Client QA / QC
W002	Liquid Penetration Test Report	QA / QC	QA / AC Client Inspector	2	Client QA / QC
W003	Radiographic Examination Report	QA / QC	QA / AC Client Inspector	4	Client QA / QC Pipeline Engineer Welding Foreman
W010	Defective Welding Rate	QA / QC	QA / QC	4	Client QA / QC Pipeline engineer Construction Manager
L001	Trench Inspection Report	P/L Engineer QA / QC	QA / QC Client Inspector	3	Client QA / QC Pipeline Engineer
L002	Coating Inspection Report	P/L Engineer QA / QC	QA / QC Client Inspector	3	Client QA / QC Pipeline Engineer
L003	Lowering-in & Backfilling Report	P/L Engineer QA / QC	QA / QC Client Inspector	3	Client QA / QC Pipeline Engineer
L004	Pigging Report	P/L Engineer QA / QC	QA / QC Client Inspector	3	Client QA / QC Pipeline Engineer
W008	Welding Book	QA / QC	QA / QC Client	3	Client QA / QC Pipeline Engineer
	Hydrotest Report	P/L Engineer QA / QC	QA / QC Client		Client QA / QC Pipeline Engineer
	Pipe and Fitting Mill Certificate	Vendor	Vendor	3	Client QA / QC Material Man
	Coating Certificate	Vendor	Vendor	3	Client QA / QC Material Man

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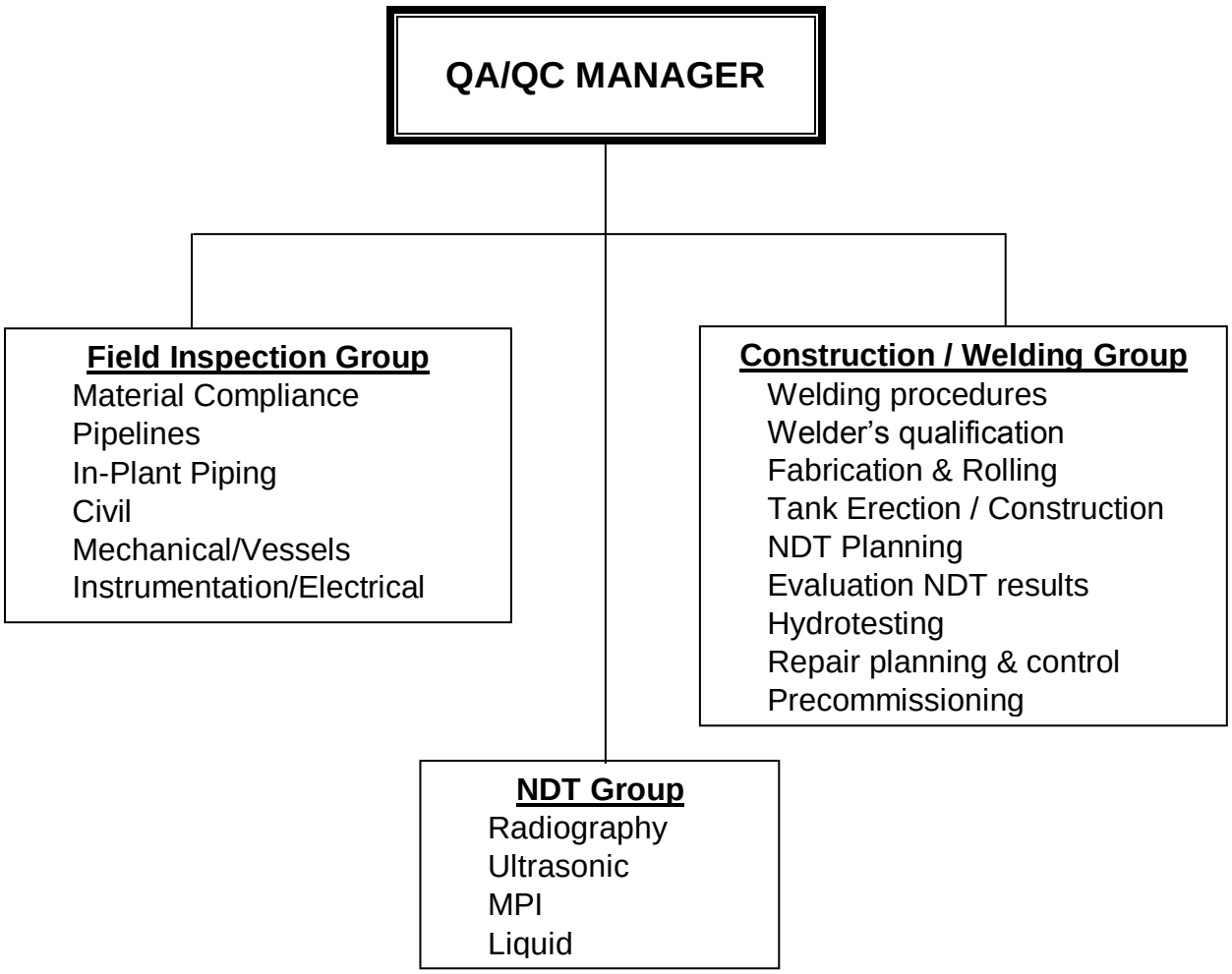
Quality Assurance / Quality Control
IN-PLANT PIPING
DOCUMENT FLOW

Index	Description	Prepared by	Signed by	Copies	Distribution
W001	Visual inspection Report	QA / AC	QA / AC Client Inspector	2	Client QA / QC
W011	Workshop/ Erection Welding Report	Piping Engineer	Piping Engineer	3	Construction Manager QA / QC Piping Engineer
W012	Order For X - ray	QA / QC	QA / AC	3	Client QA / QC Piping Engineer Welding Foreman
W002	Liquid Penetration Test Report	QA / QC	QA / AC Client Inspector	2	Client QA / QC
W003	Radiographic Examination Report	QA / QC	QA / AC Client Inspector	4	Client QA / QC Piping Engineer
W009	In-Plant Welding Progress Report	QA / QC	QA / QC		Client QA / QC Piping Engineer Construction Manager
L005	In-plant Piping Coating Report	Piping Engineer QA / QC	QA / QC Client Inspector	3	Client QA / QC Piping Engineer
W005	Welding Inspection Report	QA / QC	QA / QC	2	Client QA / QC
	Hydrotest Report	QA / QC	QA / QC Client Inspector	2	Client QA / QC
	Pipe and Fitting Mill Certificate	Vendor	Vendor	3	Client QA / QC Material Man
	Coating Certificate	Vendor	Vendor	3	Client QA / QC Material Man

DOC 02 – IN.xls

CONSTRUCTION QA/QC PLAN
FIGURE 1

QUALITY ASSURANCE/QUALITY CONTROL ORGANIZATION



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