

Engineering Procedure

SAEP-1636

28 February 2005

Installation and Checkout Plan

Process Control Standards Committee Members

Qaffas, Saleh A., Chairman

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Awami, Luay H.

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Khan, Mashkoor A.

Mubarak, Ahmed M.

ShaikhNasir, Mohammed A.

Trembley, Robert J.

Saudi Aramco DeskTop Standards

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1 Scope

The Installation and Checkout Plan (ICP) covered by this procedure shall be considered as one of the Non-Material Requirements (NMR) called for by SAEP-16. The ICP document is not required to follow the format provided in this SAEP, but shall contain the information specified.

The ICP is a deliverable document prepared by the Contractor. The Plan shall specify in detail organizational responsibilities, resource requirements, schedules, and step-by-step procedures for the installation and checkout of the System in the job site.

The ICP will be used by the Contractor to guide and control the installation and checkout of the process automation system after its delivery to the plant site.

2 Conflicts and Deviations

- 2.1 Any conflicts between this Procedure and other applicable Saudi Aramco Engineering Procedures (SAEPs), Saudi Aramco Engineering Standards (SAESs), Saudi Aramco Materials System Specifications (SAMSSs), Saudi Aramco Standard Drawings (SASDs), or industry standards, codes, and forms shall be resolved in writing by the Company or Buyer Representative through the Manager, Process & Control Systems Department of Saudi Aramco, Dhahran.
- 2.2 Direct all requests to deviate from this Procedure in writing to the Company or Buyer Representative, who shall follow internal company procedure [SAEP-302](#) and forward such requests to the Manager, Process & Control Systems Department of Saudi Aramco, Dhahran.

3 Applicable Documents

All referenced Procedures, Standards, Specifications, Codes, Forms, Drawings, and similar material or equipment supplied shall be considered part of this Procedure to the extent specified herein and shall be of the latest issue (including all revisions, addenda, and supplements) unless stated otherwise.

Saudi Aramco Engineering Procedures

[SAEP-302](#)

*Instructions for Obtaining a Waiver of a
Mandatory Saudi Aramco Engineering
Requirement*

[SAEP-1638](#)

Site Acceptance Test Plan

4 Responsibilities

The PMT has the overall responsibility for the development of the ICP. This is normally accomplished by including the ICP as a Contractor's deliverable within the Job Specification.

5 Instructions

Thorough planning and preparation are required to ensure that installation and checkout of the System is carried out properly and completely. This effort requires the coordination of manpower, equipment, building facilities, operations and maintenance organizations to achieve implementation.

Two basic types of System installation may be encountered. The first type is installation of a System for a "grass-roots" facility; the second type is a revamp of existing facilities. The revamp type requires special considerations to ensure that the plant remains in operation with minimum interruptions while the new System is being installed.

Use Appendix 1 as an outline for the I&C Plan. The Plan need not follow this outline but shall contain, as a minimum, the information specified.

6 Definitions

The following is a list of definitions of terms whose meanings may not be obvious from their usage in this document. Terms that have special meanings when capitalized are shown in that form.

Company: refers to a Saudi Arabian Oil Company (Saudi Aramco) organization.

Contract: refers to a specific contract.

Contractor: is an organization under contract to Company.

Factory Acceptance Test (FAT): demonstrates compliance of the System with all requirements, to the extent possible in the Contractor's factory environment.

Job Specification: is the statement of work for a process control project that is incorporated as Schedule "B" of the Contract, including FSD and all other attachments.

Process automation system: Systems such as Distributed Control Systems (DCS), Supervisory Control And Data Acquisition Systems (SCADA), and the associated subsystems that are used in processing facilities.

Site Acceptance Test (SAT): is the acceptance test, performed on the installed System in Saudi Arabia, that demonstrates and documents that the System performs exactly as it did during Factory Acceptance Testing.

System: is the Process Automation System (PAS) that is procured under the Contract.

Revision Summary

28 February 2005

Revised the "Next Planned Update". Reaffirmed the contents of the document, and reissued with no other changes.

Appendix 1 – Required Contents for the I&C Plan

1. Introduction

1.1 Scope

This section shall introduce the Installation and Checkout Plan, describing the content and how it is to be used.

1.2 Applicable Documents

All documents referenced in the I&C Plan shall be listed.

1.3 Terms and Abbreviations

Definitions of all acronyms, mnemonics and special terms used in the I&C Plan shall be provided.

2. Overview

A concise summary of the Plan shall be presented in this section. This overview shall include a description of any considerations affecting the installation and checkout of the System.

3. Prerequisites

All conditions and requirements that must be met or completed before the installation and checkout of the System shall be detailed. These conditions and requirements include items such as follows:

- a) Arrangements for shipping the System from the Point of Origin to the installation site
- b) Installation site inspection to be performed
- c) Start-up spares and test equipment to be delivered
- d) Proper utilities necessary and available
- e) Safety requirements, pre-cautions and procedures.

4. Resource Requirements

4.1 Personnel

Personnel skill and number requirements for the installation and checkout of the System at the installation site shall be specified. These may be expressed in general, overview terms here. More detailed information is required within the detailed procedures (see Section 5). Specific items to be addressed include:

- a) Contractor personnel requirements (skills and number) and responsibilities
- b) Company personnel requirements (skills and number) and responsibilities
- c) Special personnel or subcontractors requirements (skills and numbers) and responsibilities.

4.2 Materials and Equipment

This section shall list and describe all materials and equipment required for installation and checkout purposes. A clear distinction shall be made between materials and equipment supplied by the Contractor and those supplied by Company.

5. Installation and Checkout Procedures

5.1 General

This section shall contain the detailed step-by-step procedures for each installation and checkout task. The procedures shall include, but not be limited to, the following tasks:

- a) Handling and unpacking
- b) Assembly and installation
- c) Unit checking and calibration
- d) Point checking
- e) Initial start-up.

In the case of a project that is a revamp of an existing system or facility, "Hot Cutover" procedures that address the safe and orderly conversion from the old to the new System shall be provided. Special requirements shall, in particular, be considered for a plant or facility that must remain in operation with minimum shutdowns while the conversion takes place. The plant or facility may be partitioned into turnover packages allowing portions of the plant to be operated from the "old" control system while other portions are being controlled from the new System. Provisions shall be incorporated in the procedures so that inputs and outputs are powered selectively and safely.

The procedures shall delineate what is to be done by the Contractor and what is to be done by others or the Company. The resource requirements called out in Section 4 shall be further defined. Each procedure shall detail the manpower requirements with number and types of skills. Materials and test equipment required shall be identified and time estimates shall be given for each procedure.

Further discussion of the requirements for the procedures associated with the tasks listed above are given below. It should be noted that this list of tasks is not necessarily complete. Any other tasks necessary to accomplish installation and checkout shall be included.

5.2 Schedule

This section shall contain the detailed schedule for all the pre-installation, installation and checkout tasks. The detailed schedule shall be consistent with the requirements stated in the Job Specification and the overall project schedule contained in the System Development Plan. The detailed schedule shall be developed using delivery of the System to the installation site as a reference point.

5.3 Handling and Unpacking

Handling procedures for the System to be followed in shipment to the installation site shall be provided.

Unpacking procedures shall be given. Contractor shall prepare and provide a checklist to ensure that all the material and equipment shipped has been received. Instructions on how to handle shipping damages shall be provided.

5.4 Assembly and Installation

Detailed assembly and installation procedures for each unit or device shall be provided. All installation documents whether supplied by Contractor or Company shall be listed and attached. Examples of such documents are:

- a) System configuration drawing
- b) Control/Computer room equipment layout
- c) Power and signal cable layout
- d) Console and panel configuration drawings.

Cabling instructions shall be provided. These shall include, but not be limited to, such items as:

- a) Power connections
- b) Inter-unit connections
- c) System bus connections
- d) Rack connections
- e) Process or field interface connections
- f) Instrument and safety ground connections.

5.5 Unit Checking and Calibration

This section shall contain the unit check and calibration procedures. The procedures shall include such items as:

- a) Assuring that units are installed in accordance with drawings and manufacturing requirements
- b) Checks for shipping damage
- c) Removal of shipping restrictions such as plugs, protective covering, and tie downs
- d) Verification of continuity of circuits between interconnected units and between units and the process or field interfaces
- e) Self tests and diagnostics of individual computers and peripherals
- f) Calibration of units, where applicable, over their entire operating range.

5.6 Initial Start-up

This section shall contain the initial start-up procedures for the system. These procedures shall include getting the system configured and ready for start-up. If these procedures are contained in the Operator or Maintenance Manuals, the particular sections relevant to initial start-up procedures such as configuring procedures, switch settings, and tuning shall be referenced.

6. Documentation

This section shall contain descriptions of the documentation required for implementing an effective I&C Plan.

6.1 System Log

This section shall state the procedures for maintaining the System Log during installation and checkout of the System. These procedures shall be consistent with the System Log requirements stated in the Job Specification. The purpose of the System Log is to document, in chronological order, the date of occurrence of a problem, who reported the problem, a summary of the problem, the problem's report number, and action taken to correct the problem.

6.2 Deficiency Reports

Deficiency reports and the procedures for generating these reports at times specified in the I&C Plan shall be described. These reports shall contain the following information:

- a) Equipment shortages

- b) System deficiencies
- c) Comments and action.

6.3 Calibration Sheets

Component and point calibration sheets and the procedures for use shall be described. The calibration sheets shall be checked off and signed during the installation and checkout. These sheets shall contain the following information:

- a) Identification or tag number
- b) Duty
- c) Specification
- d) Input signal
- e) Output signal
- f) Configuration.

6.4 Sign-off Reports

This section shall contain the description of the installation and checkout sign-off report. A sign-off report shall be provided for each task required to complete installation and checkout as set forth in the detailed schedule. Comments and discrepancies shall be entered in this report. Discrepancies listed shall be resolved or accepted before a task sign-off report is initialed by the Company representative.

7. Installation and Checkout Report

The Installation and Checkout report shall be written such that, when approved by Company, it may be used as the certification that the installation and checkout has been successfully completed. The report shall include documentation of all activities and results of the installation and checkout. The report shall meet the following minimum specific requirements:

- a) Identify System and Contractor
 - b) Contain Certification Statements
 - c) Provide space for:
 - 1) Installation and Checkout location,
 - 2) Installation and Checkout start date,
 - 3) Installation and Checkout completion date,
 - 4) Configuration identification at the I&C completion, and
 - 5) Contractor representative signature.
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- d) Attached an official copy of the I&C Plan
- e) Include all documentation defined in in this Procedure.