

Engineering Procedure

SAEP-334

04 January 2006

Retrieval, Certification and Submittal
of Saudi Aramco Engineering & Vendor Drawings

Document Responsibility: Engineering Drawing Services

Saudi Aramco DeskTop Standards

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1 Scope

- 1.1 This procedure governs the retrieval, certification and submittal of Saudi Aramco Engineering and Vendor Drawings electronically. Refer to Appendix A for the flow of activities of this procedure.
- 1.2 Per this procedure, all Engineering Drawings developed (if new) and/or revised (if existing) by Saudi Aramco organizations, or by others for Saudi Aramco, must be developed or revised by means of Saudi Aramco approved electronic software and formats as specified in the Saudi Aramco Engineering Standard SAES-A-202 and this SAEP.

2 Definitions

For the purpose of this SAEP, the following definitions apply:

As-Built Drawing: an Engineering drawing that has been revised to reflect actual field conditions after the completion of construction. Additions or changes to a drawing resulting from facility modification must also be verified as 'As-Built' and referenced to the Job Order (JO) in case of PMT, Engineering Work Order (EWO) in case of Design office and organization code in case of operation.

CADD Drawings: are Engineering Drawings generated electronically using software approved by Saudi Aramco as its standard medium for development and permanent retention (see appendix 'D' of this procedure for details). Prior approval is required from the Chief Draftsman for the use of any other software.

Contractor(s): shall mean the Design, Construction and Service Contractors, Manufacturers, Vendors, Government Agencies, and other similar organizations, having a contractual relationship or a prospective contractual relationship with Saudi Aramco that may receive drawings from, or generate drawings for Saudi Aramco. Subcontractors shall also be considered as Contractors.

Data-Centric System: is a design program used to develop Instrumentation, Electrical, Mechanical and Piping related engineering information in a database format. These formats will be used to generate 2D/3D modules that are derived from the database. For more details refer to section 15.12 of this procedure.

DCC Number: is a unique number that identifies a specific DCC for the purpose of cross-referencing the certified DCC against the Engineering Drawings covered by that DCC. It also acts as a log number for the permanent archival of the DCC with EDS.

Demolition Drawing: is any existing drawing that shows the extent of the demolition work to be done. For more details refer to section 11 of this procedure.

Design Agency or IDO: refers to any Saudi Aramco Organization or Contractor charged by Saudi Aramco with the responsibility of developing and/or modifying a Saudi Aramco Engineering Drawing.

Drawing Completion Certificate or DCC: is a document bearing the names and signatures of authorized persons accepting responsibility that the associated Engineering Drawings meet the applicable Saudi Aramco Engineering Standards and procedures. The DCC fulfills the approval/certification requirement in lieu of signing the title block of each drawing individually. Refer to section 14 of this procedure.

Drawing Index File: refers to electronic data file containing information related to Engineering Drawings. The Drawing Index File is prepared by the Design Agency responsible for the development of the drawings, and is used for archival of drawing information into the PlantDoc.

Engineering Drawing: as used throughout in this procedure, is a document produced on an approved Saudi Aramco engineering form, by Saudi Aramco (or for Saudi Aramco by approved sources) which bears a Saudi Aramco engineering drawing number and which was prepared for the purpose of identifying engineering related information to be used for the construction, operation or maintenance of a Saudi Aramco plant and facility.

Engineering Drawing Services Division or EDS: of Engineering Services (ES) charged with the responsibility of analyzing and setting drawing related standards and procedures, ensuring the compliance of these standards and having the custody and management of all Saudi Aramco Engineering and Vendor Drawings defined in, and governed by this procedure and SAES-A-202.

Plant Drawing Online Collaboration – PlantDoc: is the sole corporate Saudi Aramco Engineering drawing and Data Management system that contains all approved and certified engineering data that are collected from the inception of the company. It is an automated system designed for administration and control of Saudi Aramco engineering drawings and data in a centralized library. This allows the users to query, view, print, retrieve and submit engineering and vendor drawings in addition of allowing them to retrieve new engineering drawing numbers, tag numbers, create new sheet numbers and to perform job tracking/creation functions. Refer to PlantDoc Users Guide for operational details.

Project Management Team or PMT: refers to the Saudi Aramco organization that contracts engineering, procurement and/or construction work to outside contractors under their supervision.

Proponent or OEO: shall mean the department of a Saudi Aramco operations organization responsible for operation, maintenance, safety and protection of a Saudi Aramco facility, equipment or property.

Responsible Engineering Office or REO: is a Saudi Aramco "office" that has been entrusted with the production or revision of an Engineering Drawing. Non-Saudi Aramco firms or companies are not allowed to be the designated REO. Certain individuals within the REO shall be authorized to track issued existing Engineering Drawings and Facility Data.

Revision Validation: Refers to the area on the title block of the drawings identifying the approval/certification requirements of a specific revision of an Engineering Drawing are covered by a signed DCC.

Saudi Aramco: shall mean Saudi Arabian Oil Company and its affiliated companies, including, but not limited to Aramco Overseas Company (AOC) and Aramco Services Company (ASC).

Vendor drawing: is any document developed by a manufacturer that supports the technical requirements of material or equipment and received as part of a purchase order. The vendor drawings are governed by this procedure section 17.

3 Applicable Documents

Saudi Aramco Engineering Procedure

<i>SAEP-127</i>	<i>Security and Control of Saudi Aramco Engineering Data</i>
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Saudi Aramco Engineering Standard

<i>SAES-A-202</i>	<i>Saudi Aramco Engineering Drawing Preparation</i>
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Saudi Aramco Engineering Forms

<i>9594-ENG</i>	<i>Drawing Completion Certificate (DCC)</i>
<i>9601-ENG</i>	<i>Engineering Drawing Access request</i>

Saudi Aramco General Instruction

<i>GI-0710.002</i>	<i>Classification of Sensitive Documents</i>
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4 Engineering Drawing Access

The Corporate Engineering Drawing Library "PlantDoc" is the single system that controls and administers all Saudi Aramco engineering drawings. It allows authorized users such as Project Management Teams, Design Groups and Operation Organizations to initiate and process drawing transactions such as; request new drawing numbers, retrieve existing drawings for revision and submit certified drawings. PlantDoc access shall be limited to those who have been granted authorization from their management via an approved form 9601-ENG. PlantDoc Admin and Revision Controller will also have the ability to request

tag numbers from <http://fdms.aramco.com.sa/> for the required job.

4.1 Accessing Engineering Data for Information Purposes

- 4.1.1 Accessing Saudi Aramco Engineering Drawings shall be limited only to those individuals whose jobs require access for the purpose of viewing the drawings to help them perform specific tasks and limited only to as-needed basis.
- 4.1.2 Saudi Aramco employees must have their drawing access request form [9601-ENG](#) signed by their Division Heads to access the drawings of their organizations. Access to Engineering Drawings under the responsibility of other organizations requires the approval of the requesting employee's Department Head or Project Manager in case of PMT. In addition, the requestor will have QVP access to library and standard drawings. Refer to section 4.3 for Signature Authority Table Summary.
- 4.1.3 The duration of access authorization granted to individuals of any Organization may be extended up to two (2) years or the project completion date.
- 4.1.4 Accessing Saudi Aramco Engineering Drawings by In-Kingdom or Out-Kingdom contractors requires the approval of the responsible Department Manager (or his authorized delegates) on form [9601-ENG](#).
- 4.1.5 Access granted to Saudi Aramco Engineering Drawings should be terminated by the sponsoring Saudi Aramco organization, immediately, when the employees are no longer associated with the project for which they were granted access to or at the expiration of their Saudi Aramco ID cards. This is applicable to individual contractor, sub-contractor and any other Saudi Aramco and non-Saudi Aramco personnel.

4.2 Project Management Teams and PlantDoc access

- 4.2.1 **PMT Mobilization:** the Project Manager for the subject BI shall request assignment of a PlantDoc admin for the subject BI by submitting form [9601-ENG](#) to EDSO. Refer to the table in section 4.3 for approval authority. All the applicable organizations for the subject BI shall be listed in the form.
- 4.2.2 **PlantDoc Admin authority:** The PlantDoc admin shall be authorized to create jobs (Job Orders or Engineering Work Orders) and add or remove PlantDoc revision controllers and QVP users to the assigned

job. The PlantDoc revision controller will have the ability to manage drawings assigned to his Job Order(s).

PlantDoc admin and revision controller is authorized to do all drawings transactions such as retrieve, submit engineering drawings, request new drawing numbers and request facility tag numbers.

PMT De-Mobilization: Project Manager must ensure that all outstanding PlantDoc transactions are fully resolved and all PlantDoc users authorized by the authority of this section are removed from the PlantDoc system prior to signing the Mechanical Completion Certificate (MCC). De-mobilization requirements must be coordinated with the authority that controls the MCC process.

4.3 Signature Authority Table Summary

User Type	Privilege	Signing Authority for		Access Given
		Saudi Aramco employee	Contractor employee	
PMT	PlantDoc Admin	Project Manager	Dept. Head	Create jobs For a given BI
	Revision Control			Revision control on whole BI or Selective JO's
	QVP			QVP on All ORGS.
OEO	PlantDoc Admin	Div. Head	Dept. Head	Create Jobs for his ORG only
	Revision Control			Revision on Jobs of his ORG only
	QVP	Div. Head		QVP on OEO's Org only
		Dept. Head		QVP on All Other ORGS.
IDO	PlantDoc Admin	Div. Head	Dept. Head	Create EWO's for the AREA
	Revision Control			Revision control on ALL EWOs of the AREA
	QVP			QVP on All ORGS.

5 Requesting Drawing Number

- 5.1 Assignment and control of Engineering Drawing numbers is maintained through PlantDoc. Operation Engineering Organizations, Project Management Teams and Design Groups shall obtain the drawing numbers from PlantDoc.
- 5.2 REO must return all unused drawing numbers through PlantDoc. Numbers retained by REO after completion of a project will be treated as drawings generated and kept by the REO.

- 5.3 Any Saudi Aramco engineering office or Project Management Team (PMT) that has been issued an engineering drawing number will assume the role as REO. This REO will be held accountable for the proper production and control of the drawings until formally submitted to EDSD.

6 Retrieving Existing Drawing

Project/Design Managers or the Operation Engineering Division heads shall be the principal person responsible for all drawings, drawing numbers and other transactions requested from EDSD by him or his authorized engineers as Project Representative.

6.1 Revision Number

- 6.1.1 All revision number requests shall be processed on-line through the PlantDoc. The revision number is composed of two or three-characters (the first two numeric and the third alpha code, if applicable), used to identify the approved changes on a drawing.
- 6.1.2 When retrieving an existing drawing for revision or design modification, the user will determine the level of revision that would satisfy REO's requirements, on the following basis:
- 6.1.2.1 Normal Modification; design changes or partial "As-Built" being applied to an existing drawing, in which case a numeric/alpha (three characters) revision number will be issued.
- 6.1.2.2 Full As-Built; if the drawing is brought to a 100% field verified As-Built condition; a whole numeric revision number (two characters) will be issued.
- 6.1.3 The first certified and approved issue of a new drawing shall be revision '00'. Initial of signatories must appear in the title block.
- 6.1.4 The REO must use the revision number assigned to the existing drawings for a particular project (Job Order or EWO) and shall not use them for any other job.
- 6.1.5 Only one revision number shall be issued at one time for one job (Job Order or EWO). A revision for the same job shall be issued upon submittal of the previously issued revision for that job; revision number shall be requested through PlantDoc. Each revision level must be individually recorded into the PlantDoc.

Exception:

A separate design revision may be assigned for demolition purposes in addition to the regular Design or As Built revision.

- 6.1.6 If it is determined that for some reason, a drawing does not need to be revised after a revision number has been issued, then that revision number must immediately be returned by the requestor through PlantDoc.
- 6.1.7 The Saudi Aramco Project/Design Manager shall be responsible for overseeing that the drawings are protected per instructions of SAEP-127.
- 6.1.8 Any Project Representative may be delegated the responsibility for requesting drawings for more than one project as long as these projects are under the responsibility of their Division.
- 6.1.9 In the event that a Project Representative is no longer charged with requesting drawings or no longer works for an assigned project, then the project manager shall be responsible for informing EDSD, in writing, accordingly. Project Manager shall be responsible to all existing drawings, new drawing numbers, FDMS tag numbers requested for his (BI/JO) to be submitted to PlantDoc and return the unused numbers (if any).

7 Tag Number

7.1 Requirements

- 7.1.1 All Saudi Aramco mechanical equipment, electrical equipment, process control instruments, industrial buildings, cable and conduit and process pipelines must be assigned identification/tag numbers.
- 7.1.2 The assignment and control of all identification/tag numbers excluding building numbers shall be requested on-line (<http://fdms.aramco.com.sa/>).
- 7.1.3 Identification/tag numbers shall be assigned and managed by order of numerical sequence within each category or type within a designated plant.

Exception:

For wellhead platforms, trains and units etc. where identical tags are used for each facility and a platform prefix or unit number etc. is applied to make each facility unique.

- 7.1.4 Prior to requesting any identification/tag numbers, the requestor must quantify the total numbers of each category required for the project. New grass-root projects shall not be excluded from this requirement.
- 7.1.5 Unused Tag numbers shall not be recorded/shown as "spare or not used" on the respective schedules. All unused numbers must be returned on-line (<http://fdms.aramco.com.sa/>).
- 7.1.6 All identification/tag numbers must be indicated on their respective drawings where applicable.
- 7.1.7 In case a piece of equipment, instrument, cable, or line is transferred to another plant, then a new tag number is required, and existing drawings must be revised accordingly.

7.2 Dummy Increment Numbers

A four character alpha-numeric (one alpha and three numeric) number to be used as an increment number of a non-procurement purchase/requisition order is called a Dummy Increment Number. It is required for items/materials that are not purchased by normal Saudi Aramco Purchase Order System.

7.3 Building Numbers

- 7.3.1 Use Saudi Aramco intranet service request system <http://it.aramco.com.sa/1/32651> to request new Industrial Building Numbers located outside the boundaries of process plant. Upon the request approved by the division head level or above. The details which must be provided by the proponent are specified in the online service request form, and include the name of the building, location, size and associated BI. Each request must be accompanied by properly prepared Engineering Drawings of the building, including site plans, and floor plans.
- 7.3.2 Building numbers within process plant boundaries are assigned by the Plant Management. Residential Building numbers are assigned by the respective Community Services organizations.

7.4 Cable and Conduit Tag Numbers

- 7.4.1 For the purpose of identification, all cables and conduits excluding single and interconnecting wiring are assigned special codes. Refer to Engineering Standard SAES-P-104 for complete instructions related to cables and conduits.

7.4.2 Cable & Conduit Schedule (CCS) must be prepared for the assigned tag numbers on form 2864-ENG.

7.4.3 User(s) shall use the existing Cable and Conduit Schedule (CCS) drawing by revising the existing sheet or adding new drawing/sheet.

7.5 Mechanical Equipment Tag Numbers

7.5.1 Equipment Tag Numbers are assigned to mechanical equipment and associated items as listed on standard drawing AE-036411 Sheet 002.

7.5.2 Data sheet (Mandatory) and Safety Instruction Sheet (if applicable) drawing numbers shall be completed for each tag.

7.5.4 Auxiliary or secondary equipment shall have the same sequence number as the primary equipment having the corresponding marking, i.e., for Pump G-0012, Motor GM-0012, Gear GG-0012.

7.5.5 The Suffix Letter is used only to distinguish between two pieces of identical equipment at one location for same process. For example, in the case of two pumps for one tank, G-0012A and G-0012B.

7.6 Electrical Equipment Tag Numbers

7.6.1 Electrical Equipment Tag Numbers are assigned to the equipment listed on Standard Drawing AE-036411 Sheet 003.

7.6.2 The tag numbers are controlled in numeric sequence for each voltage code per each equipment type (marking) per each power source (normally Substation) in each plant. For offshore platforms the switchgear Van tag number will be used as feeder source instead of substation.

7.6.3 Reference drawing number for drawings such as One Line Diagram, Inter Connection Diagram, etc., must be entered when requesting electrical equipment.

7.7 Instrument Tag Numbers

7.7.1 Each item of instrumentation shall be assigned a specific "tag number". Refer to Saudi Aramco Engineering Standard SAES-J-004 for details related to Instrument Identification Codes. Each instrument tag/loop number within a plant is unique for specific category of instruments listed in SAES-J-005 item 6.1.2. Instrument tag numbers are assigned in sequence each category of instruments.

- 7.7.2 In a given measurement or control loop, all instruments are assigned the same Identification Numbers. To distinguish two similar instruments in the same loop, an alpha character will be added at the end of the Identification Number.
- 7.7.3 Instrument Installation Schedule (IIS) must be prepared for the assigned tag numbers for each category of instruments on forms 2781A-ENG to 2781E-ENG, 2799-ENG, and 7076-ENG.
- 7.7.4 User(s) shall use the existing Instrument Installation Schedule (IIS) drawing of respective category by revising the existing sheet or adding new drawing/sheet.
- 7.7.5 Instrument Loop/Segment Diagram
- Users shall assign a new sheet number to an existing drawing or a new drawing number from PlantDoc.

7.8 Line Numbers

- 7.8.1 Line Numbers are assigned in numerical sequence to all welded or flanged above ground or underground pipelines within a plant regardless of their sizes, type of material or service. Each one is unique in a plant.
- 7.8.2 Piping with threaded connections and plumbing do not require line numbers unless deemed necessary by the PMT or Proponent for operating or maintenance.
- 7.8.3 Line Designation Table (LDT) must be prepared for the assigned line numbers on form 2824-ENG.
- 7.8.4 User(s) shall use the existing Line Designation Table (LDT) drawing by revising the existing sheet or adding new drawing/sheet.
- 7.8.5 Line numbers must include line designation as outlined per Line Class Designator System, SAES-L-105 Item 7 and Standard Drawing AD-036204.
- 7.8.6 Line numbers shall be assigned to pieces of process pipe between:
- Block valve to block valve
 - Equipment to block valve
 - Equipment to equipment

8 Plant Number

8.1 Plant Number Assignment

- 8.1.1 The issue and control of Saudi Aramco Plant Numbers is the responsibility of EDSD. A complete listing of currently assigned plant numbers with descriptions is available on the EDSD home page at <http://edsd.aramco.com.sa/>.
- 8.1.2 To apply for a new Plant Number, a request letter from the Division Head or above of the Operations Engineering organization must be submitted to EDSD stating the following information:
 - a) Name of requesting operations organization, Org. code and mailing address.
 - b) Operation's representative name and phone number.
 - c) Approved BI & JO numbers.
 - d) New facility name (max 35 characters).
 - e) Facility location (includes a site plan and indicates the nearest existing plant).
 - f) Brief description of the new facility.
- 8.1.3 If a PMT is initiating the request, then the operations engineering proponent (Division Head or above) concurrence is required.
- 8.1.4 Any change to the description (title) or status of a plant (abandoned, dismantled, mothballed, renamed, etc.) must be reported to EDSD by the Division Head or above of the Operating Engineering organizations.
- 8.1.5 To change the responsibility of a plant to another organization, concurrence of present proponent (Operation Engineering Division Head or above) is required.

8.2 Plant Number Changes

- 8.2.1 Changing of plant number on engineering drawings within same operating organization:
 - a) Request the next revision (As-built full numeric) revision number.
 - b) Revise the drawing that includes changing the plant number and plant description in the title block.

- c) The proposed owner shall indicate in the revision description "CHANGED PLANT FROM XXX to YYY "along with other As-built revisions, if any.
- d) Operation's concurrence/Review is required on the DCC even for Non-Key drawings.
- e) Plant number on Instrument Installation Schedules, Cable and Conduit Schedules, Line Designation Tables and Instrument Loop Diagrams should not be changed without EDSD (Facility Data Group) prior approval.
- f) Submit the drawing through PlantDoc on a separate DCC.
- g) PlantDoc data will be modified with the new plant number by EDSD.

8.2.2 Changing of plant number on engineering drawings of different operating organization:

- a) The present owner shall request the next (As-built full numeric) revision number.
- b) The proposed owner shall revise the drawing that includes changing the plant number and plant description in the title block.
- c) The proposed owner shall indicate in the revision description "CHANGED PLANT FROM XXX to YYY "along with other As-Built revisions, if any.
- d) Concurrence of both Operation organizations is required on the DCC even for Non-Key drawings.
- e) Plant number on Instrument Installation Schedules, Cable and Conduit Schedules, Line Designation Tables and Instrument Loop Diagrams should not be changed without EDSD (Facility Data Group) prior approval.
- f) The present owner shall submit the drawing through PlantDoc on a separate DCC.
- g) PlantDoc data will be modified with the new plant number by EDSD.

9 Project Proposal

- 9.1 Existing engineering Drawings may be used for Project proposal purposes by utilizing electronic copies of these drawings from PlantDoc and removing all the

information (e.g. plant number, drawing number, revision number, certification information etc.) related to the original drawing.

- 9.2 Engineering Drawings developed for project proposal purposes may be assigned Engineering Drawing and Tag Numbers. These numbers can be further used for the detailed design. Project Proposal follows the same process as Detail Design to reduce rework at later stages.
- 9.3 All Project Proposal drawings that were assigned engineering drawing numbers MUST be submitted to PlantDoc as per this procedure and [SAES-A-202](#).
- 9.4 All Project Proposal drawings shall be marked "Project Proposal" in the title block area.
- 9.5 Dummy Job Orders shall be created into PlantDoc. For example BI 10-12345 will carry the dummy Job Order number 10-12345-0000.

10 Drawing Cancellation

- 10.1 Drawings being cancelled shall follow the same procedures and levels of certification and approval as followed for revised drawings:
 - a) When a drawing is revised as cancelled or if a cancelled drawing is being reactivated, then a whole numeric revision number shall be assigned.
 - b) Submission of CADD files for cancelled drawings is not required. The metadata MUST be updated on PlantDoc to reflect the status and reason of cancellation during the final submittal.
 - c) Concurrence of Operations organization is required on the DCC even for Non-Key drawings.
- 10.2 An engineering drawing MUST NOT be cancelled when:
 - a) Any revision is checked out for design or As-built.
 - b) Completely redrawn. In this case, a higher revision will be applied to the same drawing number.
 - c) Only part of the drawing is void or deleted.
 - d) It is related to more than one plant or facility unless consent is secured from the proponents of all the facilities involved.

11 Demolition Drawing

Demolition drawings shall be prepared when absolutely necessary required for construction project for demolitions only. However, demolition drawings are treated

the same as revising a drawing. Demolition information should never be shown in the same drawing with new construction information.

11.1 When preparing demolition design drawings, the following steps must be taken:

- a) Obtain, through PlantDoc a design revision (alphanumeric) and electronic file of the existing drawing(s) to be used for demolition. New drawing numbers should not be assigned to a demolition drawing.
- b) Indicate in PlantDoc that electronic file is required for 'Demolition' purposes.
- c) Submit the drawing through PlantDoc along with other drawings if any.
- d) Add in the Title Block:
Word 'DEMOLITION' in line 1 of the title block.

11.2 For design work subsequent to demolition, obtain a new revision per procedure.

12 As-Built

Any approved and certified "key" drawing and any other drawing designated by the Operations Engineering and/or the Project Management Team, must be updated to reflect the 'As-Built' condition. In addition, drawings with significant changes must be updated to 'As-Built' condition. Additions or changes to a drawing resulting from facility modification must also be verified as 'As-Built' and referenced to the secondary Job Order/EWO.

12.1 All As-Built drawings are processed in the same manner as normal drawing revisions.

12.2 The Engineering Operation Organization for the plant or facility is responsible for overseeing that the "KEY" drawings are kept updated (As-Built). All modifications, design revisions "Alpha Numeric" are gathered and incorporated into one engineering drawing to achieve next As-Built "full revision" issued through PlantDoc, and submitted to PlantDoc for archival.

12.3 The drawings can be issued for construction with holds (clouded areas). These drawings must be revised to As-Built condition and certified.

12.4 Design, project and construction drawings shall be submitted to EDSD with revision number assigned from PlantDoc immediately after the completion of detailed design project. For a new or existing drawing being brought to a 100% field verified As-Built condition, a whole numeric revision number shall be requested.

- 12.5 If two or more modifications, for different job numbers, are to be made on a drawing due to: As-Built, Design change, etc., each modification must be individually recorded and archived with a separate revision number for each job.
- 12.6 Engineering Drawings shall be updated to As-Built condition when required. During the construction phase of the facility, REO is the responsible party for ensuring that the drawing reflects the As-Built condition.

13 Certification

Certification means that the signatory represents that the certified drawing(s) satisfies Saudi Aramco Engineering Standards and related Procedures.

- 13.1 All Saudi Aramco Engineering Drawings must be approved, certified and dated as required, herein, by means of completing a Drawing Completion Certificate (DCC) and the title block of each drawing (Appendix "B"). Uncertified drawings will not be accepted for inclusion into the corporate drawing system.
- 13.2 One single project (Job Order or EWO) may have more than one DCC. Each one or more Engineering Discipline(s) (e.g., Piping, Mechanical, Electrical, Instrumentation, Communication, Structural, Architectural, **Civil, etc.**) **may** have one DCC and the Project Engineer shall sign for all disciplines. No more than one project shall be covered by one DCC.
- 13.3 A Design Agency and the Saudi Aramco organizations responsible must complete the title block and DCC approval/certification as follows:
 - a) If a **Contractor** is responsible for the design work, the Contractor's technical personnel shall review and sign the 'Design Certification' portion of the DCC. The Contractor's Engineering Manager or Project Manager with overall design responsibility shall certify the drawings by signing in the space marked "Certified by" in the DCC.
 - b) If a **Saudi Aramco** organization is responsible for the design information, that organization's technical personnel shall assume the responsibility of the Design Agency by reviewing and signing the "Design Certification" portion. A Saudi Aramco employee representing the organization charged with the design shall certify the drawings by signing the space marked "Certified by".
 - c) The DCC shall be completed and signed by the Design Agency and the appropriate Saudi Aramco organizations prior to the release of the drawings for bidding or construction. The DCC shall then become part of the bid and construction documents.

- d) A representative from a Saudi Aramco organization (e.g., Engineering, Medical, Security, Loss Prevention and/or Fire Protection, etc.) may be required to review certain drawings depending on their content. The Saudi Aramco Project Manager and the Design Agency shall make this determination prior to releasing the drawings for construction. The Engineering, Medical, Security, Loss Prevention and/or Fire Protection, etc. review shall be indicated by signing in the space marked "Other" in the DCC and the drawing.
 - e) The Project Manager and Design Agency should determine specific drawings to be reviewed by other Saudi Aramco organizations and those organizations shall be listed on the DCC. This would ensure that drawings were not released before receiving proper approval by the proper organizations.
 - f) The full names of all the signatories and dates must appear on the DCC per engineering discipline and initials in the title block of each drawing.
 - g) The names of the signatories of DCC must match the initials shown on drawings. Signing drawings for others is not permitted.
- 13.4 Each drawing title block must indicate if review by Saudi Aramco is required for that drawing by filling the "Required" box. If review is required, the three letter initials and date of the Saudi Aramco personnel responsible for the review of the drawings, and the signing of the DCC, shall be indicated in the "Saudi Aramco Review for Key Drawings" and "Other" (when required) portions of the drawing title block and the DCC. All Key Drawings must be reviewed by the appropriate Saudi Aramco organizations (PMT & Proponent) and, therefore, shall be indicated as "Required" for review in the title block.
- 13.5 The signatures in the "Saudi Aramco Review for Key Drawings" and "Other" portions of the DCC are indicative of the reviewer's familiarity with the contents of the drawings and agreement with the design in principle. The signatures do not relieve the Design/Construction Agency of its full responsibility for compliance with all relevant project scope, standards, procedures, specifications, codes, contract documents, etc.
- 13.6 After the signing of the DCC and affixing the Revision Certification information, each relevant electronic file (drawing) must be managed to prevent modification. It is user's responsibility to prevent such modifications until each of these files is submitted into PlantDoc.
- 13.7 Approval levels for design changes made to previously certified engineering drawings are the same as for new drawings. Each revision must be individually approved and certified per this SAEP.
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- 13.8 Upon completion of the DCC (properly signed), each drawing must indicate that it is covered by the DCC for approval and certification requirements, by adding the "Revision Validation" information, which must include the following:
- a) The revision number of the drawing being certified. New drawings issued for construction must bear the revision number 00.
 - b) The Drawing Completion Certificate number assigned per Item 14, below.
- 13.9 Drawings bearing a completed "Revision Validation" and covered by a signed DCC shall be considered as legal documents and may be used for procurement and/or construction.

14 DCC Number Formats

- 14.1 For drawings developed by an Operations Engineering Organization (OEO), where no JO or EWO is used, the DCC number format shall be:

xxxxxx-MMY-yyy Example: 765200-1003-001

xxxxxx = OEO Org Code (6 numerical digits with no dash).

MMYY = Month and year when a drawing has been submitted.

yyy = Numerical sequential number of the DCC of the drawing submittal within a given month.

- 14.2 For drawings developed by an Internal Design Office (IDO) using EWO, the DCC number format shall be:

YYaxxx-yyy Example: 04C123-001

YY = Year when an Engineering Work Order (EWO) was initiated.

a = The IDO alpha office code representing the IDO office location (e.g., C = Central Area, N = Northern Area, S = Southern Area, W = Western Area).

xxx = EWO number as assigned and controlled by the IDO.

yyy = Numerical sequential number of the DCC of the drawings developed under the assigned EWO.

- 14.3 For drawings developed by a Project Management Team (PMT) under a Job Order (JO) number, the DCC number shall be:

xx-xxxxx-xxxx-nnn	Example: 10-12345-1234-001
xx-xxxxx-xxxx	= The Job Order number as assigned by SAP.
nnn	= Numerical sequential number of the DCC of the drawings developed under the assigned Job Order.

15 Submittal

Per this procedure, all key and non-key (new, revised, cancelled and cancelled/superseded) Saudi Aramco Engineering Drawings must be submitted to PlantDoc for permanent retention and management.

- 15.1 All drawings must be submitted through PlantDoc. Scanned copy of the DCC shall be loaded into PlantDoc during submittal. The signed original DCC shall be mailed to EDSD for processing and record.
- 15.2 All Drawings must be prepared, revised and submitted as per Appendix D and E. Drawings issued in RASTER format must be made:
 - 15.2.1 VECTOR or HYBRID before being submitted for inclusion into PlantDoc. Both files of a HYBRID drawing must be included in the same submittal. The minimum accepted HYBRID must include the latest appropriate VECTOR border and title block information. Refer to SAES-A-202 for more details.
 - 15.2.2 Excel format as per appendix D and E.
 - 15.2.3 PDF format for Data-Centric as per appendix D and E. Refer to section 15.12 for details.
- 15.3 Drawings issued for revision in VECTOR files must be revised and submitted as VECTOR only. Unless required in other format as per appendix D and E.
- 15.4 The Drawing Index information that is indicated in Appendix C shall be used to process submitted drawings through PlantDoc using an ASCII file format. An alternative option is to submit Drawings by entering each drawing record separately into PlantDoc.
- 15.5 Project Drawings Submittal Process
 - 15.5.1 The REO shall submit the following completed certified drawings as a first batch to EDSD through PlantDoc:
 - 1) Instrument Installation Schedule (IIS);
 - 2) Cable & Conduit Schedule (CCS);

- 3) Line Designation Tables (LDT);
- 4) Equipment Data Sheets (DAT);
- 5) Safety Instruction Sheet (SIS);
- 6) Instrument Loop Diagram (ILD).

This is to ensure that all tag numbers assigned for this project are requested from EDSD. Also to avoid 'after-the fact' acceptance of project drawings without checking the tag numbers issued.

- 15.5.2 After the acceptance of the first batch of drawings mentioned above, EDSD will inform the REO to submit the rest of the project drawings.
 - 15.5.3 At the end of the project, REO must submit to EDSD the following:
 - 1) Return of un-used drawing numbers through PlantDoc;
 - 2) Return of un-used revision numbers through PlantDoc;
 - 3) Return of un-used tag numbers through FDMS system.
 - 15.6 All sheets of a new multi-sheet drawing must be submitted together.
 - 15.7 The drawings will not be considered accepted until EDSD verification is completed.
 - 15.8 When the drawings are accepted for inclusion into PlantDoc, the user can check the status of his submitted drawings on-line. The Saudi Aramco organization responsible for the development of the drawings must maintain a temporary backup of all the submitted drawings. When confirmed as accepted, the backups must, then be deleted unless deemed justified to maintain longer (refer to SAEP-127).
 - 15.9 Any drawing found not in compliance with the Saudi Aramco CADD standards and procedures will be returned on-line to the Saudi Aramco Project Manager or REO for correction through PlantDoc. After correction, the drawings shall be re-submitted through PlantDoc under the same job maintaining the same DCC. The copy of the DCC shall be submitted along with the transmittal through PlantDoc as a second submittal and so on.
 - 15.10 A Drawing Control Sheet must be submitted for each Job Order or EWO. All engineering drawings (revised and new) for the project must be listed in this Drawing Control Sheet.
 - 15.11 REO should not release any drawing (CADD file) to other users or for any other projects. All drawings MUST be requested through PlantDoc.
-

15.12 Data-Centric

- 15.12.1 Drawings may be developed/generated using any software design tools, e.g., (3D model, Instrumentation Data Management and Intelligent Drawing, FRAMME-TFIDS, AutoCAD, etc.), but the final submittal of engineering drawings shall conform to the formats and standards as described in this procedure and SAES-A-202. These drawings/data are considered not certified/approved unless the DCC are processed along with the 2D drawings per this procedure.
- 15.12.2 EDSD will accept the 2D drawings generated from the Data-Centric program as per Appendix C & D of this procedure and [SAES-A-202](#). The database shall be delivered to Operation Organization (Proponent) who will be responsible for further updates and manage the incorporation of other Engineering Data generated by the design contractors. PDF and other non editable formats shall be kept in PlantDoc for reference and revision control only while future updates shall be made from the Data-Centric system. Saudi Aramco IT Organization shall be responsible for archiving, loading and retrieving the Data-Centric to the users.
- 15.12.3 PMT should get prior concurrence from the relevant Operation Organization (Proponent) before implementing any Data-Centric systems.
- 15.12.4 All 2D drawings generated from the Data-Centric system(s) shall be using Saudi Aramco standard templates and marked in the Drawing File Type (For more details refer to [SAES-A-202](#) section 5.10).

16 EDSD Acceptance

When a drawing is reviewed and accepted by EDSD for inclusion into PlantDoc, EDSD Verification is automatically notified into PlantDoc.

17 Vendor Drawings

17.1 Development

- 17.1.1 Vendor Drawings must contain complete and accurate information regarding all procedures and specifications required for the installation, operation and maintenance of the equipment or material by Saudi Aramco organizations throughout its operating life.
- 17.1.2 Vendor Drawings must contain complete and accurate dimensions on plan layouts, sections and details relative to equipment positioning and

installation connection.

17.1.3 Regardless of their country of origin, all Vendor Drawings must be prepared and submitted to Saudi Aramco using English as the principal language on the documents. If seen absolutely necessary, or useful, by the Proponent or PMT organization, a translation to another language shall be included at the very minimum.

17.1.4 Submittal of vendor drawings of any (BI/JO) is PMT responsibility, in order to be sure of their submittal into PlantDoc prior signing the MCC.

17.2 Certification

All Vendor Drawings must be approved/certified by the manufacturer/design agency and concurred by PMT at the final submittal, prior to submitting them to the PlantDoc.

17.3 File Formats

Vendor drawings shall be submitted to the PlantDoc in electronic media only. PlantDoc will only support viewing and printing of the following formats; Word, Excel, AutoCAD, Microstation, PDF, JPG and TIFF.

File type	File extension
WORD	DOC
EXCEL	XLS
AUTOCAD	DWG
MICROSTATION	DGN
ACROBAT PDF	PDF
JPG	JPG
TIFF	TIF

17.4 Naming Convention

Vendor drawings shall be numbered as the original drawing number received from the manufacturer. It is optional to show the Dummy increment numbers used for non-procurement purchase/requisition items of LSTK projects on vendor drawings. No Drawing (name) can be duplicated under the given Org-ID and Plant-ID.

17.5 Submittal

Vendor drawings are submitted into PlantDoc based on the following:

17.5.1 Mandatory Data

17.5.1.1 Plant Number: is the assigned Saudi Aramco Plant number.

17.5.1.2 Job order: is the assigned Job Order or EWO. If the JO/EWO is unknown, the user can create JO/EWO specified for those Vendor drawings that have no JO/EWO.

17.5.1.3 File type: refer to 17.3 above

17.5.2 Optional Data (Highly Recommended)

17.5.2.1 Description: is the title which describes the content of the drawings.

17.5.2.2 Tag number: is the tag numbers associated with the vendor drawings if any.

17.5.2.3 Equipment Type: such as pump, tank, vessel, etc.

17.5.2.4 Vendor Name: is the manufacturer/designer of this equipment.

17.5.3 Format of ASCII file

Drawing number (35) + space + plant no (4) + space + job log no (17) + space + description (35) + space + tag no (20) + space + equipment no (20) + space + vendor name (30).

17.6 Access

Vendor Drawings will be treated in PlantDoc exactly as Engineering Drawings with respect to PlantDoc Privilege. Any one having Revision Control privilege will be able to submit these drawings into PlantDoc. Any one having QVP privilege to the ORG will be able to view vendor drawings of that particular organization/plant.

17.7 Conversion

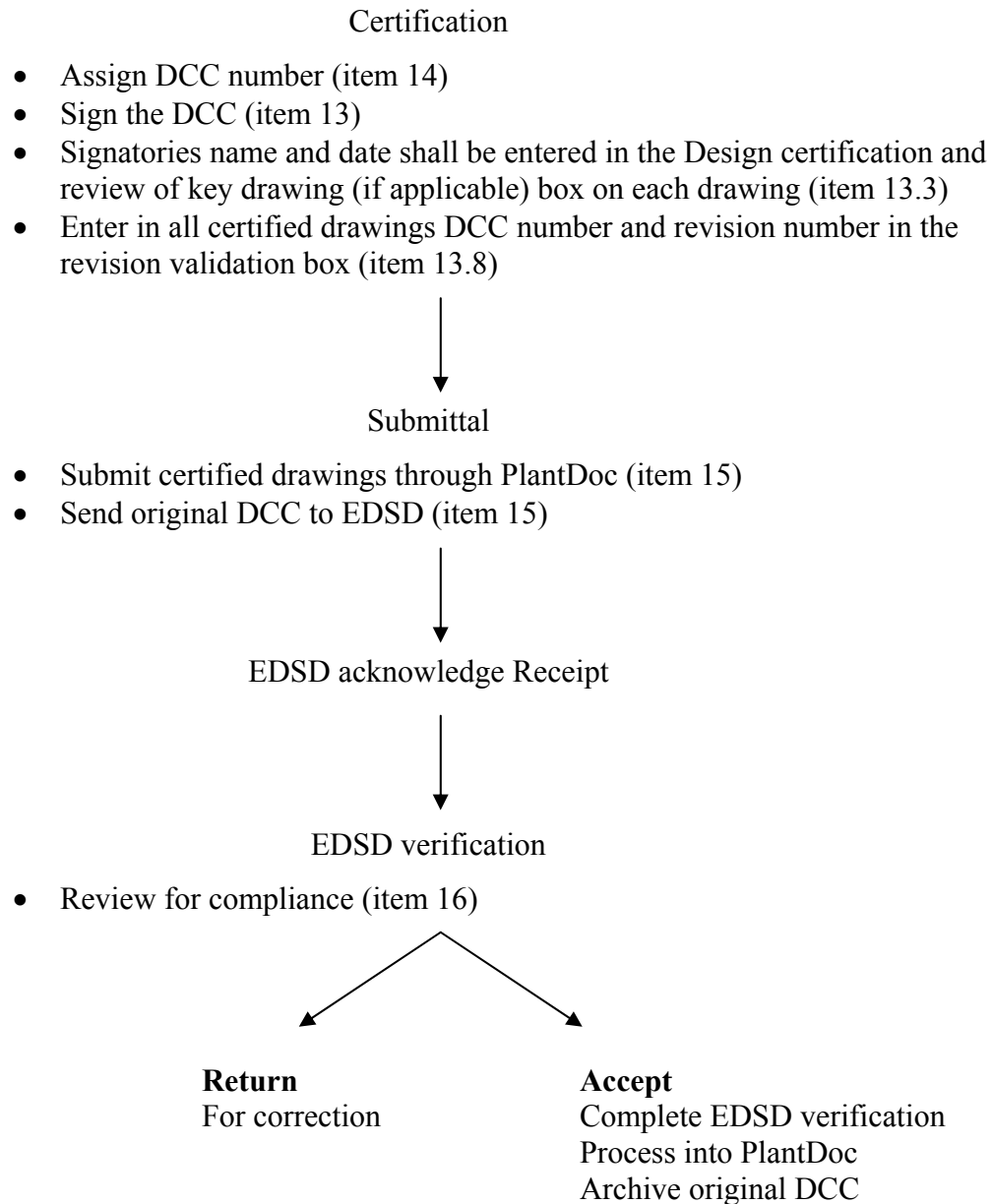
Any Vendor Drawing that has been designated by the manufacturer and agreed by the Project Management Team (PMT) and Proponent as having high significance for continued equipment operation and having the potential of being revised by Saudi Aramco at any time in the future shall be converted to Engineering Drawing as per the Saudi Aramco Engineering Standard [SAES-A-202](#) and this procedure.

17.8 Vendor drawings shall not be issued for further revisions.

- 17.9 Vendor drawings shall not be reviewed by EDSD and Drawing Completion Certificate (DCC) is not required. EDSD will archive vendor drawings into PlantDoc for reference only. The authorized individual who submits the vendor drawings into PlantDoc is responsible for the contents of the drawings.

Revision Summary	
31 December 2003	Major revision.
29 September 2004	Merged vendor drawings section of SAEP-111.
04 January 2006	Editorial revisions.

Appendix A – Flow Chart



Appendix B – Certification

Page - 1 of 3
(Instructions)

1. Design Certification Refer to item 13 for more details

(By Design Agency – required on all drawings)

- 1.1 Engg.: Type the initial and date of the individual charged, on behalf of the Design Agency for the correctness of the engineering design of the drawing. This shall be the same individual whose full name and signature are on the DCC.
- 1.2 Certified By: Type the initial and date of the individual bearing the overall responsibility the project in the capacity of a Project Manager at minimum. This shall be the same individual whose full name and signature are on the DCC.

2. Review for Key Drawings

(By Saudi Aramco – required on all Key Drawings. Key Drawings must be check-marked as "REQUIRED").

- 2.1 Const. Agency: Type the initial and date of the Saudi Aramco senior Engineer, familiar with the nature and Company requirements of the project design, representing the Construction Agency. This shall be the same individual whose full name and signature are on the DCC.
- 2.2 Operations: Type the initial and date of the Saudi Aramco senior Representative of the Saudi Aramco proponent Operations organization. This shall be the same individual whose full name and signature are on the DCC.

3. Other (By Saudi Aramco – Key and non-Key Drawings)

By: Type the initial of a senior representative of any Saudi Aramco organization that is required to review specific drawings for reasons such as Safety, Security, Medical or other along with the full name of that organization.

4. Revision Validation (By Design Agency)

- 4.1 Revision number "00" for new drawings or as issued by the PlantDoc for existing drawings.
- 4.2 The DCC number assigned per Item-14.

5. Submittal

- 5.1 The user's information that is granted authority to submit drawings through PlantDoc shall complete this section.
- 5.2 For second time submittal or additional submittals, use a copy of the first submitted DCC and fill out the second submittal section or as required. Normally, this process is for re-submitting non-compliant drawings.

6. EDSD Acceptance (By EDSD/Saudi Aramco)

EDSD recognizes acceptance of the drawing that it is compliant with Saudi Aramco drawing standards and practices.

Appendix B – Certification

Page - 2 of 3
(Title Block)

REVISION VALIDATION				
THIS REVISION NO. IS COVERED, FOR ALL APPROVAL/CERTIFICATION REQUIREMENTS, PER SAEP-334, UNDER DRAWING COMPLETION CERTIFICATE NO.				
XX-XXXX-XXXX-XXX				
DESIGN CERTIFICATION (DESIGN AGENCY)		REVIEW FOR KEY DRAWINGS ☒ REQUIRED (SAUDI ARAMCO)		OTHER
ENGG./DATE	CERTIFIED BY/DATE	CONST. AGENCY/DATE	OPERATIONS/DATE	BY/DATE
REV.NO.	DATE	REVISION DESCRIPTION		
JOB ORDER/EWO NO.		THIS REVISION IS NOT TO BE USED FOR CONSTRUCTION UNTIL CERTIFIED AND DATED		
SAUDI ARABIAN OIL COMPANY				
				DRAWING TYPE
SAUDI ARABIA				
PLANT NO.	INDEX	DRAWING NUMBER	SHT. NO.	REV. NO.

Saudi Aramco 5994 ENG. (09/03)

EMERGENCY DRAWING	RESTRICTED	VECTOR	CADD-05
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Appendix B – Certification

Page - 3 of 3
(DCC)

DRAWING COMPLETION CERTIFICATE (DCC)

Saudi Aramco 9594 ENG (01/2004)

This is to certify that the attached listed drawings (New and Revised) carried out under the Job Number indicated in this Certificate and on the drawings have been prepared in accordance with the applicable Saudi Aramco Engineering Standards, Procedures and Practices per the Scope of Work specific to the project described below. This DCC shall satisfy all the Engineering Drawing Approval/Certification requirements as set in SAEP-334 and SAES-A-202 (except what has/have been formally waived).

DCC NO.	4.2
DISCIPLINE	
JO / EWO	
Organization: Name:	Code:
Number of Drawings:	

NOTE: Attach copies of all EDSD approved waiver requests

Project Title/ Description:		
Location(s):		
Contract/Service Order No.:		
Contractor:		
Address:	Telephone:	Fax:

1 Design Agency Certification

Engineering:	1.1	Name	Signature	Date
	1.2	Name	Signature	Date
Certified by: (Engineering/Project Manager)		Name	Signature	Date

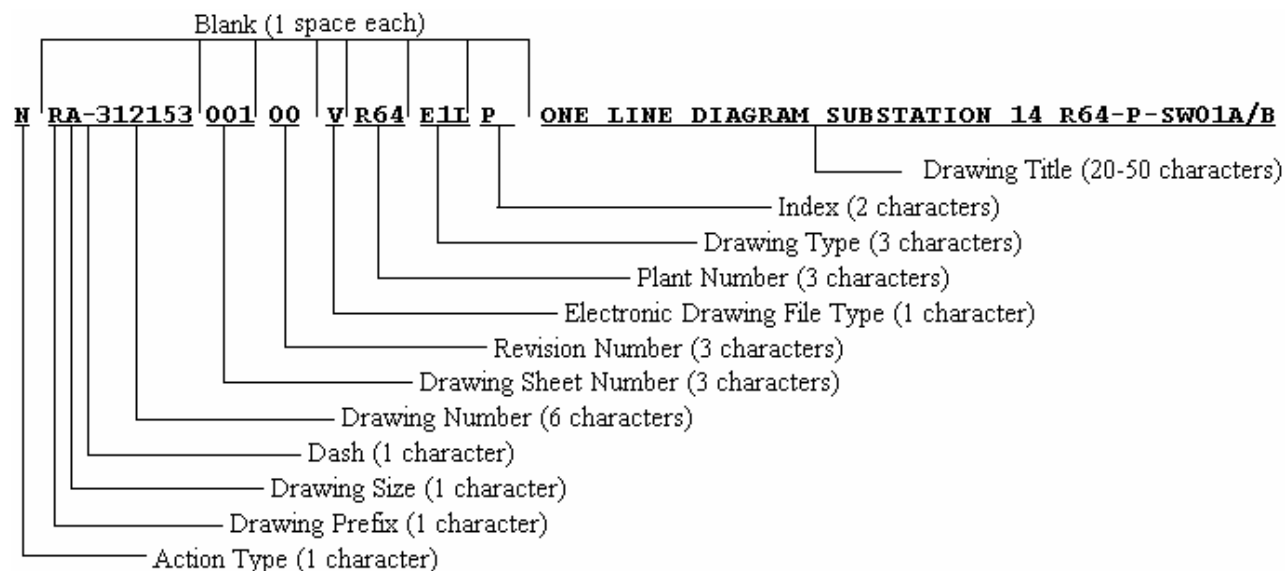
2 Saudi Aramco Review (for key drawings)

Construction Agency: (Key Drawings)	2.1	Name	Signature	Date
Operations: (Key Drawings)	2.2	Name	Signature	Date
Others:	3	Organization	Name	Signature
		Organization	Name	Signature

Submitted By:		5 First submittal		For Rejected Drawings	
				Second Submittal	
				Submittal	
Name					
Badge :					
Job Title:					
Signature:					
Date:					
E-mail :					
Tel / Fax Nos. :					
For EDSD Use:					
Verified By	6	Name	Signature	Date	

Appendix C – Drawing Index Information

ASCII text File Format



Action Type

N = New or revised drawing
C = Cancelled drawing

Index

Primary index is one character; if secondary index is required add one separate additional character next to the primary index. For example; JP

Electronic drawing file type

V = 100% MicroStation vector drawing
A = 100% AutoCAD vector drawing
H = Hybrid drawing (there shall be two electronic file, MicroStation Vector & Raster)
B = Hybrid drawing (there shall be two electronic file, AutoCAD Vector & Raster)
X = Microsoft Excel
W = Microsoft Word
P = PDF Acrobat (for Data-Centric only refer to section 15.12)
Z = PSR file (for data-Centric only refer to section 15.12)

Note: When preparing the Drawing Index information as a text file, each record in the file should correspond to one drawing sheet. This requirement applies also to HYBRID drawings where two Electronic Drawing files (Vector and Raster) are submitted for each drawing. Bulk drawings are represented with a single Drawing Index entry using the first sheet number.

Appendix D – Drawing Files Format

Drawing/Document Type	Dwg. Size	File Format	Requirement
Scope of Work	E	Microsoft Word	Single File for one or multi-page documents.
List of Material	E	Microsoft Word or Excel	Single File for one or multi-page documents.
Engineering Drawings such as: Safety Instruction Sheet (SIS) Instrument Installation Schedule (IIS) Cable & Conduit Schedule (CCS) Line Designation Table (LDT) Equipment Data Sheet Instrument Specification Sheet (ISS) Drawing Control sheet	D, E	Microsoft Excel	Single file for each sheet of drawing.
Other Engineering Drawings	A-D	MicroStation / AutoCAD	Single file for each sheet of drawing
Data Centric (Refer to section 15.12)	D,E	PDF Acrobat	Single file for each sheet of drawing + Database

Notes:

1. Drawings will be generated using corresponding Saudi Aramco Engineering Form.
2. Documents such as: Material take-off sheets, Construction Specifications, Operating Specifications/Instructions, Technical Specification, Painting Specifications, Inspection Records, Equipment List, Construction Schedule, Construction Bar Charts, Cover Sheets, Calculation Sheets, Meter Reading Tables, Manuals, Design Criteria, Sketches, Requisitions, Quotations, Spare Part Lists, Performance/Calibration Curves, Purchase Orders, Installation Witness Reports, will not be assigned an engineering drawing numbers. However, if these drawings are considered critical to the operation organization, these drawings **SHALL BE** assigned engineering drawing numbers after consulting Chief Draftsman and submitted for archival into the PlantDoc.

Appendix E – Engineering Forms List

<http://csd.aramco.com.sa/std/index.asp>

Form #	Size	Index	Prop. Dept	Title	Format
0145	E	-	ENG	ENGINEERING DATA TRANSMITTAL	EXCEL
0375	E	J	P&CSD	VALVE DATA FOR MOUNTING MOTOR OPERATORS	EXCEL
2504	D	J	P&CSD	INSTRUMENT NAME PLATE LISTING	EXCEL
2505-1	E	G	CSD	DATA SHEET - POWER DRIVEN RECIPROCATING PUMP	EXCEL
2505-2	E	G	CSD	DATA SHEET - POWER DRIVEN RECIPROCATING PUMP	EXCEL
2505M-1	E	G	CSD	DATA SHEET - POWER DRIVEN RECIPROCATING PUMP	EXCEL
2505M-2	E	G	CSD	DATA SHEET - POWER DRIVEN RECIPROCATING PUMP	EXCEL
2507M-1	E	G	CSD	DATA SHEET - DIRECT ACTING STEAM PUMP	EXCEL
2507M-2	E	G	CSD	DATA SHEET - DIRECT ACTING STEAM PUMP	EXCEL
2514-1	E	G	CSD	DATA SHEET - ROTARY POSITIVE DISPLACEMENT PUMP	EXCEL
2514-2	E	G	CSD	DATA SHEET - ROTARY POSITIVE DISPLACEMENT PUMP	EXCEL
2514M-1	E	G	CSD	DATA SHEET - ROTARY POSITIVE DISPLACEMENT PUMP	EXCEL
2514M-2	E	G	CSD	DATA SHEET - ROTARY POSITIVE DISPLACEMENT PUMP	EXCEL
2615	A	-	ENG	STANDARD DRAWING SHEET 'A' SIZE	DGN
2517	E	J	P&CSD	DATA SHEET - PIVOT TUBE METER	EXCEL
2519	E	L	CSD	PIPING DETAIL SHEET - MATERIAL FOR SPOOL	EXCEL
2601	E	A	INSP	EQUIPMENT INSPECTION SCHEDULE	EXCEL
2615-1	A	*	ENG	FACE SHEET-STANDARD DRAWING SHEET 'A' SIZE	DGN
2616	E	-	ENG	STANDARD DRAWING SHEET 'E' SIZE (WORD/EXCEL/DGN)	W/E/DGN
2616-1	E	*	ENG	FACE SHEET-STANDARD DRAWING SHEET 'E' SIZE	DGN/XLS
2617	D	A	ENG	DRAWING CONTROL SHEET	EXCEL
2634	B	-	ENG	STANDARD DRAWING SHEET 'B' SIZE	DGN
2634-1	B	*	ENG	FACE SHEET-STANDARD DRAWING SHEET 'B' SIZE	DGN
2635	C	-	ENG	STANDARD DRAWING SHEET 'C' SIZE	DGN
2635-1	C	*	ENG	FACE SHEET-STANDARD DRAWING SHEET 'C' SIZE	DGN
2636	D	-	ENG	STANDARD DRAWING SHEET 'D' SIZE	DGN/XLS
2636-1	D	*	ENG	FACE SHEET-STANDARD DRAWING SHEET 'D' SIZE	DGN
2693	E	A	CSD	SAFETY INSTRUCTION SHEET - TANKS	EXCEL
2694	E	A	CSD	SAFETY INSTRUCTION SHEET - VESSELS	EXCEL
2696	B	D	CSD	LAYOUT OF APPURTENANCES (TANK)	DGN
2713	E	A	CSD	SAFETY INSTRUCTION SHEET - SHELL AND TUBE EXCHANGER	EXCEL
2714	D	E	CSD	SHELL AND TUBE HEAT EXCHANGER SPECIFICATION	EXCEL
2716	E	E	CSD	DATA SHEET - AIR COOLED HEAT EXCHANGER	EXCEL
2731	E	A	CSD	SAFETY INSTRUCTION SHEET - FIRED HEATERS	EXCEL
2731M	E	A	CSD	SAFETY INSTRUCTION SHEET - FIRED HEATERS	EXCEL
2741-1	E	G	CSD	DATA SHEET - CENTRIFUGAL PUMP - HOR. & VERT. IN-LINE PUMPS	EXCEL
2741-2	E	G	CSD	DATA SHEET - CENTRIFUGAL PUMP - HOR. & VERT. IN-LINE PUMPS	EXCEL
2741-3	E	G	CSD	DATA SHEET - CENTRIFUGAL PUMP - HOR. & VERT. IN-LINE PUMPS	EXCEL
2741-4	E	G	CSD	DATA SHEET - CENTRIFUGAL PUMP - HOR. & VERT. IN-LINE PUMPS	EXCEL
2741M-1	E	G	CSD	DATA SHEET - CENTRIFUGAL PUMP - HOR. & VERT. IN-LINE PUMPS	EXCEL

Appendix E – Engineering Forms List (Cont'd)

Form #	Size	Index	Prop. Dept	Title	Format
2741M-2	E	G	CSD	DATA SHEET - CENTRIFUGAL PUMP - HOR. & VERT. IN-LINE PUMPS	EXCEL
2741M-3	E	G	CSD	DATA SHEET - CENTRIFUGAL PUMP - HOR. & VERT. IN-LINE PUMPS	EXCEL
2741M-4	E	G	CSD	DATA SHEET - CENTRIFUGAL PUMP - HOR. & VERT. IN-LINE PUMPS	EXCEL
2742	E	A	CSD	SAFETY INSTRUCTION SHEET - PUMPS	EXCEL
2742M	E	A	CSD	SAFETY INSTRUCTION SHEET - PUMPS	EXCEL
2748-1	E	G	CSD	DATA SHEET - CENTRIFUGAL PUMP FOR VERTICAL LINE SHAFT PUMPS	EXCEL
2748-2	E	G	CSD	DATA SHEET - CENTRIFUGAL PUMP FOR VERTICAL LINE SHAFT PUMPS	EXCEL
2748-3	E	G	CSD	DATA SHEET - CENTRIFUGAL PUMP FOR VERTICAL LINE SHAFT PUMPS	EXCEL
2748-4	E	G	CSD	DATA SHEET - CENTRIFUGAL PUMP FOR VERTICAL LINE SHAFT PUMPS	EXCEL
2748M-1	E	G	CSD	DATA SHEET - CENTRIFUGAL PUMP FOR VERTICAL LINE SHAFT PUMPS	EXCEL
2748M-2	E	G	CSD	DATA SHEET - CENTRIFUGAL PUMP FOR VERTICAL LINE SHAFT PUMPS	EXCEL
2748M-3	E	G	CSD	DATA SHEET - CENTRIFUGAL PUMP FOR VERTICAL LINE SHAFT PUMPS	EXCEL
2748M-4	E	G	CSD	DATA SHEET - CENTRIFUGAL PUMP FOR VERTICAL LINE SHAFT PUMPS	EXCEL
2773	E	J	P&CSD	ISS - PRESSURE INSTRUMENTS	EXCEL
2773M	E	J	P&CSD	ISS - PRESSURE INSTRUMENTS	EXCEL
2775	E	J	P&CSD	ISS - BULB TYPE TEMPERATURE INSTRUMENTS	EXCEL
2775M	E	J	P&CSD	ISS - BULB TYPE TEMPERATURE INSTRUMENTS	EXCEL
2777	E	J	P&CSD	ISS - RECEIVING INSTRUMENTS	EXCEL
2777M	E	J	P&CSD	ISS - RECEIVING INSTRUMENTS	EXCEL
2778	E	J	P&CSD	ISS - LOCAL FLOW INSTRUMENTS	EXCEL
2778M	E	J	P&CSD	ISS - LOCAL FLOW INSTRUMENTS	EXCEL
2780	E	J	P&CSD	ISS - BALANCED BRIDGE TYPE TEMP. INSTRUMENTS	EXCEL
2780M	E	J	P&CSD	ISS - BALANCED BRIDGE TYPE TEMP. INSTRUMENTS	EXCEL
2781A	D	J	ENG	INSTR. INSTALL. SCH. - PRESSURE INSTRUMENTS (RESTRICTED)	EXCEL
2781B	D	J	ENG	INSTR. INSTALL. SCH. - TEMPERATURE INSTRUMENTS (RESTRICTED)	EXCEL
2781C	D	J	ENG	INSTR. INSTALL. SCH. - FLOW INSTRUMENTS (RESTRICTED)	EXCEL
2781D	D	J	ENG	INSTR. INSTALL. SCH. - LEVEL INSTRUMENTS (RESTRICTED)	EXCEL
2781E	D	J	ENG	INSTR. INSTALL. SCH. - MISCELLANEOUS INSTRUMENTS (RESTRICTED)	EXCEL
2786M	E	J	P&CSD	ISS - TRAPS AND DRAINERS	EXCEL
2787	E	J	P&CSD	ISS - PRESSURE REGULATORS	EXCEL
2787M	E	J	P&CSD	ISS - PRESSURE REGULATORS	EXCEL
2788	E	J	P&CSD	ISS - DIFFERENTIAL TYPE LEVEL INSTRUMENTS	EXCEL
2788M	E	J	P&CSD	ISS - DIFFERENTIAL TYPE LEVEL INSTRUMENTS	EXCEL
2790	E	J	P&CSD	ISS - VARIABLE AREA FLOW METERS	EXCEL
2790M	E	J	P&CSD	ISS - VARIABLE AREA FLOW METERS	EXCEL
2793M	E	J	P&CSD	ISS - DRAFT GAUGES	EXCEL
2794	E	J	P&CSD	ISS - SNAP ACTING VALVES	EXCEL
2794M	E	J	P&CSD	ISS - SNAP ACTING VALVES	EXCEL
2799	D	J	P&CSD	INSTR. INSTALL. SCH. - RELIEF VALVES (RESTRICTED)	EXCEL
2811-1	E	K	CSD	DATA SHEET - STEAM/GAS EXPANSION TURBINE	EXCEL
2811-2	E	K	CSD	DATA SHEET - STEAM/GAS EXPANSION TURBINE	EXCEL
2811-3	E	K	CSD	DATA SHEET - STEAM/GAS EXPANSION TURBINE	EXCEL
2811-4	E	K	CSD	DATA SHEET - STEAM/GAS EXPANSION TURBINE	EXCEL

Appendix E – Engineering Forms List (Cont'd)

Form #	Size	Index	Prop. Dept	Title	Format
2811M-1	E	K	CSD	DATA SHEET - STEAM/GAS EXPANSION TURBINE	EXCEL
2811M-2	E	K	CSD	DATA SHEET - STEAM/GAS EXPANSION TURBINE	EXCEL
2811M-3	E	K	CSD	DATA SHEET - STEAM/GAS EXPANSION TURBINE	EXCEL
2811M-4	E	K	CSD	DATA SHEET - STEAM/GAS EXPANSION TURBINE	EXCEL
2812-1	E	K	CSD	DATA SHEET - CENTRIFUGAL COMPRESSORS	EXCEL
2812-2	E	K	CSD	DATA SHEET - CENTRIFUGAL COMPRESSORS	EXCEL
2812-3	E	K	CSD	DATA SHEET - CENTRIFUGAL COMPRESSORS	EXCEL
2812-4	E	K	CSD	DATA SHEET - CENTRIFUGAL COMPRESSORS	EXCEL
2812-5	E	K	CSD	DATA SHEET - CENTRIFUGAL COMPRESSORS	EXCEL
2812-6	E	K	CSD	DATA SHEET - CENTRIFUGAL COMPRESSORS	EXCEL
2812-7	E	K	CSD	DATA SHEET - CENTRIFUGAL COMPRESSORS	EXCEL
2812M-1	E	K	CSD	DATA SHEET - CENTRIFUGAL COMPRESSORS	EXCEL
2812M-2	E	K	CSD	DATA SHEET - CENTRIFUGAL COMPRESSORS	EXCEL
2812M-3	E	K	CSD	DATA SHEET - CENTRIFUGAL COMPRESSORS	EXCEL
2812M-4	E	K	CSD	DATA SHEET - CENTRIFUGAL COMPRESSORS	EXCEL
2812M-5	E	K	CSD	DATA SHEET - CENTRIFUGAL COMPRESSORS	EXCEL
2812M-6	E	K	CSD	DATA SHEET - CENTRIFUGAL COMPRESSORS	EXCEL
2812M-7	E	K	CSD	DATA SHEET - CENTRIFUGAL COMPRESSORS	EXCEL
2821	E	A	CSD	SAFETY INSTRUCTION SHEET - CRITICAL PLANT PIPING	EXCEL
2821M	E	A	INSP	SAFETY INSTRUCTION SHEET - CRITICAL PLANT PIPING	EXCEL
2824	D	A	ENG	LINE DESIGNATION TABLE (RESTRICTED)	EXCEL
2825	B	L	ENG	ISOMETRIC PIPING DETAILS	DGN
2825-1	C	L	ENG	ISOMETRIC PIPING DETAILS	DGN
2825-2	D	L	ENG	ISOMETRIC PIPING DETAILS	DGN
2829	D	L	CSD	PIPING ARRANGEMENT AT PROPORTIONING PUMP	EXCEL
2864	D	P	ENG	CABLE AND CONDUIT SCHEDULE (RESTRICTED)	EXCEL
2871	B	Q	ENG	STEEL BENDING DETAILS	DGN
3063	E	A	CSD	PILE DRIVING RECORD	EXCEL
3063M	E	A	CSD	PILE DRIVING RECORD	EXCEL
3175	E	J	P&CSD	ORIFICE PLATE DETAILS FOR RF FLANGES	EXCEL
3175-A	E	J	P&CSD	ISS-ORIFICE PLATE DETAIL FOR	EXCEL
3176	E	J	P&CSD	ORIFICE PLATE DETAIL - SEGMENTAL	EXCEL
3176-A	E	J	P&CSD	ORIFICE PLATE DETAIL - RESTRICTION	EXCEL
3176M	E	J	P&CSD	ORIFICE PLATE DETAIL - SEGMENTAL	EXCEL
3177	E	J	P&CSD	ORIFICE PLATE DETAIL - QUADRANT EDGE	EXCEL
3185-1	E	J	P&CSD	INSTRUMENT MATERIAL SUMMARY SHEET - ITEM 001 TO 025	EXCEL
3185-2	E	J	P&CSD	INSTRUMENT MATERIAL SUMMARY SHEET - ITEM 026 TO 057	EXCEL
3185-3	E	J	P&CSD	INSTRUMENT MATERIAL SUMMARY SHEET - ITEM 058 TO 084	EXCEL
3185-4	E	J	P&CSD	INSTRUMENT MATERIAL SUMMARY SHEET - ITEM 101 TO 108C	EXCEL
3185-5	E	J	P&CSD	INSTRUMENT MATERIAL SUMMARY SHEET - ITEM 109 TO 121	EXCEL
3185-6	E	J	P&CSD	INSTRUMENT MATERIAL SUMMARY SHEET - ITEM 121A TO 135B	EXCEL
3185-7	E	J	P&CSD	INSTRUMENT MATERIAL SUMMARY SHEET - ITEM 136 TO 168	EXCEL
3185-8	E	J	P&CSD	INSTRUMENT MATERIAL SUMMARY SHEET - ITEM 169 TO 196	EXCEL

Appendix E – Engineering Forms List (Cont'd)

Form #	Size	Index	Prop. Dept	Title	Format
3185-A	E	J	P&CSD	INSTRUMENT MATERIAL SUMMARY SHEET	EXCEL
3186	E	J	P&CSD	ISS - VIBRATION SWITCHES	EXCEL
3186M	E	J	P&CSD	ISS - VIBRATION SWITCHES	EXCEL
3188	E	J	P&CSD	METER READING TABLES	EXCEL
3188M	E	J	P&CSD	METER READING TABLES	EXCEL
3195	E	J	P&CSD	ISS - PISTON OPERATED VALVES	EXCEL
3195M	E	J	P&CSD	ISS - PISTON OPERATED VALVES	EXCEL
5645-1	E	A	CSD	SAFETY INSTRUCTION SHEET - CROSS COUNTRY PIPELINE - MAIN LINE PIPE	EXCEL
5645-2	E	A	CSD	SAFETY INSTRUCTION SHEET - CROSS COUNTRY CRITICAL PIPING	EXCEL
5645-3	E	A	CSD	SAFETY INSTRUCTION SHEET - TERMINAL AND BULK PLANT PIPING	EXCEL
5994	A	A	ENG	PIPING & INSTRUMENT DIAGRAM	DGN
5994-1	B	A	ENG	PIPING & INSTRUMENT DIAGRAM	DGN
6078	E	J	P&CSD	ISS - FLOW INSTRUMENTS	EXCEL
6078M	E	J	P&CSD	ISS - FLOW INSTRUMENTS	EXCEL
6079	E	J	P&CSD	ISS - LEVEL SWITCHES	EXCEL
6079M	E	J	P&CSD	ISS - LEVEL SWITCHES	EXCEL
6080	E	J	P&CSD	ISS - FILLED SYSTEM TYPE TEMPERATURE SWITCHES	EXCEL
6080M	E	J	P&CSD	ISS - FILLED SYSTEM TYPE TEMPERATURE SWITCHES	EXCEL
6081	E	J	P&CSD	ISS - THERMOCOUPLE/RTD SWITCHES	EXCEL
6081M	E	J	P&CSD	ISS - THERMOCOUPLE/RTD SWITCHES	EXCEL
6225	D	J	ENG	FACE SHEET FOR 'D' SIZE DRAWINGS (FOR IIS, CCS & LDT)	EXCEL
6227	D	P	CSD	DATA SHEET - MOTOR CONTROLLER(S) NO(S). FOR SUBSTATION NO.	EXCEL
6231	E	E	CSD	BOLT AND GASKET LIST	EXCEL
6231-M	E	E	CSD	BOLT AND GASKET LIST	EXCEL
6232	C	P	CSD	LIGHTING PANEL SCHEDULE	DGN
6233	D	L	CSD	VALVE DATA FOR MOUNTING MOTOR OPERATORS	EXCEL
6233-1	E	L	CSD	VALVE DATA SHEET	EXCEL
6236	D	P	CSD	MOTOR CONTROL CENTER NO. FOR SUBSTATION NO. _____	EXCEL
6236-M	D	P	CSD	MOTOR CONTROL CENTER NO. FOR SUBSTATION NO. _____	EXCEL
6237-1	E	K	CSD	DATA SHEET FOR DIESEL ENGINES	EXCEL
6237-2	E	K	CSD	DATA SHEET FOR DIESEL ENGINES	EXCEL
6237-3	E	K	CSD	DATA SHEET FOR DIESEL ENGINES	EXCEL
6237M-1	E	K	CSD	DATA SHEET FOR DIESEL ENGINES	EXCEL
6237M-2	E	K	CSD	DATA SHEET FOR DIESEL ENGINES	EXCEL
6237M-3	E	K	CSD	DATA SHEET FOR DIESEL ENGINES	EXCEL
6238	E	A	CSD	SAFETY INSTRUCTION SHEET - AIR-COOLED HEAT EXCHANGER	EXCEL
6239	E	J	P&CSD	ISS – GENERAL	EXCEL
6285	A	A	ENG	PLAN AND PROFILE	DGN
6286-1	E	K	CSD	DATA SHEET - RECIPROCATING COMP., PLANT & INST. AIR SERVICE	EXCEL
6286-2	E	K	CSD	DATA SHEET - RECIPROCATING COMP., PLANT & INST. AIR SERVICE	EXCEL
6286M-1	E	K	CSD	DATA SHEET - RECIPROCATING COMP., PLANT & INST. AIR SERVICE	EXCEL
6286M-2	E	K	CSD	DATA SHEET - RECIPROCATING COMP., PLANT & INST. AIR SERVICE	EXCEL

Appendix E – Engineering Forms List (Cont'd)

Form #	Size	Index	Prop. Dept	Title	Format
6736	D	M	CSD	DATA SHEET FOR OFFSHORE PLATFORM	EXCEL
6880-1	E	G	CSD	DATA SHEET - SUBMERSIBLE PUMPS	EXCEL
6880-2	E	G	CSD	DATA SHEET - SUBMERSIBLE PUMPS	EXCEL
6880M-1	E	G	CSD	DATA SHEET - SUBMERSIBLE PUMPS	EXCEL
6880M-2	E	G	CSD	DATA SHEET - SUBMERSIBLE PUMPS	EXCEL
7076	D	J	ENG	INSTR. INSTALL. SCH. – MOV/AOV/HOV/GOV (RESTRICTED)	EXCEL
7305	E	A	CSD	DATA SHEET - EQUIPMENT NOISE	EXCEL
7460	B	J	ENG	INSTRUMENT LOOP DIAGRAM - SIZE 'B'	DGN
7460-1	C	J	ENG	INSTRUMENT LOOP DIAGRAM - SIZE 'C'	DGN
7460-2	D	J	ENG	INSTRUMENT LOOP DIAGRAM - SIZE 'D'	DGN
8001-1	E	K	CSD	DATA SHEET - RECIPROCATING COMPRESSORS PROCESS AIR & GAS	EXCEL
8001-2	E	K	CSD	DATA SHEET - RECIPROCATING COMPRESSORS PROCESS AIR & GAS	EXCEL
8001-3	E	K	CSD	DATA SHEET - RECIPROCATING COMPRESSORS PROCESS AIR & GAS	EXCEL
8001-4	E	K	CSD	DATA SHEET - RECIPROCATING COMPRESSORS PROCESS AIR & GAS	EXCEL
8001M-1	E	K	CSD	DATA SHEET - RECIPROCATING COMP. PROCESS - AIR & GAS SERVICE	EXCEL
8001M-2	E	K	CSD	DATA SHEET - RECIPROCATING COMP. PROCESS - AIR & GAS SERVICE	EXCEL
8001M-3	E	K	CSD	DATA SHEET - RECIPROCATING COMP. PROCESS - AIR & GAS SERVICE	EXCEL
8001M-4	E	K	CSD	DATA SHEET - RECIPROCATING COMP. PROCESS - AIR & GAS SERVICE	EXCEL
8002-1	E	K	CSD	DATA SHEET – COMBUSTION GAS TURBINES	EXCEL
8002-2	E	K	CSD	DATA SHEET – COMBUSTION GAS TURBINES	EXCEL
8002-3	E	K	CSD	DATA SHEET – COMBUSTION GAS TURBINES	EXCEL
8002-4	E	K	CSD	DATA SHEET – COMBUSTION GAS TURBINES	EXCEL
8002-5	E	K	CSD	DATA SHEET – COMBUSTION GAS TURBINES	EXCEL
8002-6	E	K	CSD	DATA SHEET – COMBUSTION GAS TURBINES	EXCEL
8002-7	E	K	CSD	DATA SHEET – COMBUSTION GAS TURBINES	EXCEL
8002-8	E	K	CSD	DATA SHEET – COMBUSTION GAS TURBINES	EXCEL
8002-9	E	K	CSD	DATA SHEET – COMBUSTION GAS TURBINES	EXCEL
8002M-1	E	K	CSD	DATA SHEET – COMBUSTION GAS TURBINES	EXCEL
8002M-2	E	K	CSD	DATA SHEET – COMBUSTION GAS TURBINES	EXCEL
8002M-3	E	K	CSD	DATA SHEET – COMBUSTION GAS TURBINES	EXCEL
8002M-4	E	K	CSD	DATA SHEET – COMBUSTION GAS TURBINES	EXCEL
8002M-5	E	K	CSD	DATA SHEET – COMBUSTION GAS TURBINES	EXCEL
8002M-6	E	K	CSD	DATA SHEET – COMBUSTION GAS TURBINES	EXCEL
8002M-7	E	K	CSD	DATA SHEET – COMBUSTION GAS TURBINES	EXCEL
8002M-8	E	K	CSD	DATA SHEET – COMBUSTION GAS TURBINES	EXCEL
8002M-9	E	K	CSD	DATA SHEET – COMBUSTION GAS TURBINES	EXCEL
8003-1	E	K	CSD	DATA SHEET - GEAR UNIT (INCRSRS & RED. OF PARALL. SHFT DES.)	EXCEL
8003-2	E	K	CSD	DATA SHEET - GEAR UNIT (INCRSRS & RED. OF PARALL. SHFT DES.)	EXCEL
8003-3	E	K	CSD	DATA SHEET - GEAR UNIT (INCRSRS & RED. OF PARALL. SHFT DES.)	EXCEL
8003M-1	E	K	CSD	DATA SHEET - GEAR UNIT (INCRSRS & RED. OF PARALL. SHFT DES.)	EXCEL
8003M-2	E	K	CSD	DATA SHEET - GEAR UNIT (INCRSRS & RED. OF PARALL. SHFT DES.)	EXCEL
8003M-3	E	K	CSD	DATA SHEET - GEAR UNIT (INCRSRS & RED. OF PARALL. SHFT DES.)	EXCEL
8004-1	E	G	CSD	DATA SHEET – LUBRICATION, SHAFT SEALING & CONT. OIL SYSTEM	EXCEL

Appendix E – Engineering Forms List (Cont'd)

Form #	Size	Index	Prop. Dept	Title	Format
8004-2	E	G	CSD	DATA SHEET – LUBRICATION, SHAFT SEALING & CONT. OIL SYSTEM	EXCEL
8004-3	E	G	CSD	DATA SHEET – LUBRICATION, SHAFT SEALING & CONT. OIL SYSTEM	EXCEL
8004-4	E	G	CSD	DATA SHEET – LUBRICATION, SHAFT SEALING & CONT. OIL SYSTEM	EXCEL
8004M-1	E	G	CSD	DATA SHEET – LUBRICATION, SHAFT SEALING & CONT. OIL SYSTEM	EXCEL
8004M-2	E	G	CSD	DATA SHEET – LUBRICATION, SHAFT SEALING & CONT. OIL SYSTEM	EXCEL
8004M-3	E	G	CSD	DATA SHEET – LUBRICATION, SHAFT SEALING & CONT. OIL SYSTEM	EXCEL
8004M-4	E	G	CSD	DATA SHEET – LUBRICATION, SHAFT SEALING & CONT. OIL SYSTEM	EXCEL
8009-1	E	F	CSD	DATA SHEET - FIRED HEATER	EXCEL
8009-2	E	F	CSD	DATA SHEET - FIRED HEATER	EXCEL
8009-3	E	F	CSD	DATA SHEET - FIRED HEATER	EXCEL
8009-4	E	F	CSD	DATA SHEET - FIRED HEATER	EXCEL
8009-5	E	F	CSD	DATA SHEET - FIRED HEATER	EXCEL
8009-6	E	F	CSD	DATA SHEET - FIRED HEATER	EXCEL
8009M-1	E	F	CSD	DATA SHEET - FIRED HEATER	EXCEL
8009M-2	E	F	CSD	DATA SHEET - FIRED HEATER	EXCEL
8009M-3	E	F	CSD	DATA SHEET - FIRED HEATER	EXCEL
8009M-4	E	F	CSD	DATA SHEET - FIRED HEATER	EXCEL
8009M-5	E	F	CSD	DATA SHEET - FIRED HEATER	EXCEL
8009M-6	E	F	CSD	DATA SHEET - FIRED HEATER	EXCEL
8010-1	E	G	CSD	DATA SHEET - POSITIVE DISPLACEMENT PUMP	EXCEL
8010-2	E	G	CSD	DATA SHEET - POSITIVE DISPLACEMENT PUMP	EXCEL
8010M-1	E	G	CSD	DATA SHEET - POSITIVE DISPLACEMENT PUMP	EXCEL
8010M-2	E	G	CSD	DATA SHEET - POSITIVE DISPLACEMENT PUMP	EXCEL
8111	B	J	ENG	INDEX SHEET INSTRUMENT LOOP DIAGRAM	DGN
8111-1	C	J	ENG	INDEX SHEET INSTRUMENT LOOP DIAGRAM	DGN
8111-2	D	J	ENG	INDEX SHEET INSTRUMENT LOOP DIAGRAM	DGN
8012	E	K	CSD	SPECIFICATION FOR COMPRESSED AIR DRYER	EXCEL
8014	D	Q	CSD	DATA SHEET – FOUNDATION DESIGN (DYNAMIC DESIGN)	EXCEL
8014-M	D	Q	CSD	DATA SHEET – FOUNDATION DESIGN (DYNAMIC DESIGN)	EXCEL
8020-111	E	J	P&CSD	ISS - FLOW TRANSMITTERS (DIFF. PRESSURE TYPE)	EXCEL
8020-111M	E	J	P&CSD	ISS - FLOW TRANSMITTERS (DIFF. PRESSURE TYPE)	EXCEL
8020-112	E	J	P&CSD	ISS - FLOW TRANSMITTERS-SMART (DIFFERENTIAL PRESSURE)	EXCEL
8020-115	E	J	P&CSD	ISS - METERING ORIFICE CALCULATION CONVENTIONAL UNITS	EXCEL
8020-115M	E	J	P&CSD	ISS - METERING ORIFICE CALCULATION SI UNITS	EXCEL
8020-116	E	J	P&CSD	ISS - VENTURI TUBE SPECIFICATION & CALCULATION	EXCEL
8020-116M	E	J	P&CSD	ISS - VENTURI TUBE SPECIFICATION & CALCULATION	EXCEL
8020-117	E	J	P&CSD	ISS - TURBINE METERS	EXCEL
8020-117M	E	J	P&CSD	ISS - TURBINE METERS	EXCEL
8020-118	E	J	P&CSD	ISS - LIQUID POSITIVE DISPLACEMENT METERS	EXCEL
8020-119	E	J	P&CSD	ISS - BI-DIRECTIONAL METER PROVER	EXCEL
8020-124	E	J	P&CSD	ISS - RESTRICTION ORIFICE CALCULATION AND SPECIFICATION	EXCEL
8020-124M	E	J	P&CSD	ISS - RESTRICTION ORIFICE CALCULATION AND SPECIFICATION	EXCEL
8020-200	E	J	P&CSD	ISS - PRESSURE TRANSMITTERS-SMART (ABS, GAGE, & DP)	EXCEL

Appendix E – Engineering Forms List (Cont'd)

Form #	Size	Index	Prop. Dept	Title	Format
8020-212	E	J	P&CSD	ISS - PRESSURE AND DIFFERENTIAL PRESSURE GAUGES	EXCEL
8020-213-1	E	J	P&CSD	ISS - PRESSURE AND D/P SWITCH	EXCEL
8020-213-2	E	J	P&CSD	ISS - PRESSURE AND D/P SWITCH	EXCEL
8020-312	E	J	P&CSD	ISS - LEVEL GAUGE GLASSES	EXCEL
8020-314	E	J	P&CSD	ISS - LEVEL INSTRUMENTS	EXCEL
8020-318	E	J	P&CSD	ISS - AUTOMATIC TANK GAUGING EQUIPMENT	EXCEL
8020-319	E	J	P&CSD	ISS - AUTOMATIC TANK GAUGE – RADAR	EXCEL
8020-320	E	J	P&CSD	ISS - LEVEL DEVICE, TIME DOMAIN REFLECTOMETER	EXCEL
8020-400	E	J	P&CSD	ISS - TEMPERATURE TRANSMITTERS-SMART	EXCEL
8020-413	E	J	P&CSD	ISS - MECHANICAL TEMPERATURE SWITCHES	EXCEL
8020-415-1	E	J	P&CSD	ISS - THERMOCOUPLE (T/C) ASSEMBLY	EXCEL
8020-415-2	E	J	P&CSD	ISS - THERMOCOUPLE (T/C) ASSEMBLY	EXCEL
8020-415M-1	E	J	P&CSD	ISS - THERMOCOUPLE (T/C) ASSEMBLY	EXCEL
8020-415M-2	E	J	P&CSD	ISS - THERMOCOUPLE (T/C) ASSEMBLY	EXCEL
8020-416-1	E	J	P&CSD	ISS - RESISTANCE TEMPERATURE DETECTOR (RTD)	EXCEL
8020-416-2	E	J	P&CSD	ISS - RESISTANCE TEMPERATURE DETECTOR (RTD)	EXCEL
8020-418-1	E	J	P&CSD	ISS – THERMOWELL	EXCEL
8020-418-2	E	J	P&CSD	ISS – THERMOWELL	EXCEL
8020-418M-1	E	J	P&CSD	ISS – THERMOWELL	EXCEL
8020-418M-2	E	J	P&CSD	ISS – THERMOWELL	EXCEL
8020-419-1	E	J	P&CSD	ISS - TEMPERATURE MONITOR	EXCEL
8020-419-2	E	J	P&CSD	ISS - TEMPERATURE MONITOR	EXCEL
8020-419M-1	E	J	P&CSD	ISS - TEMPERATURE MONITOR	EXCEL
8020-419M-2	E	J	P&CSD	ISS - TEMPERATURE MONITOR	EXCEL
8020-511-1	E	J	P&CSD	ISS – CHROMATOGRAPHS	EXCEL
8020-511-2	E	J	P&CSD	ISS – CHROMATOGRAPHS	EXCEL
8020-512	E	J	P&CSD	ISS - OXYGEN ANALYZER	EXCEL
8020-514	E	J	P&CSD	ISS – COMBUSTIBLE GAS AND HYDROGEN SULFIDE MONITORS	EXCEL
8020-515	E	J	P&CSD	ISS - MOISTURE ANALYZERS	EXCEL
8020-517	E	J	P&CSD	ISS - DENSITY METERS FOR GAS AND LIQUID SERVICE	EXCEL
8020-525	E	J	P&CSD	ISS - HYDROCARBON LIQUID SAMPLING SYSTEMS	EXCEL
8020-605	E	J	P&CSD	ISS - SURGE RELIEF VALVES	EXCEL
8020-611-1	E	J	P&CSD	ISS - PRESSURE RELIEF VALVES CONVENTIONAL & BALANCED TYPES	EXCEL
8020-611-1M	E	J	P&CSD	ISS - SAFETY RELIEF VALVES	EXCEL
8020-611-2	E	J	P&CSD	ISS - PRESSURE RELIEF VALVES CONVENTIONAL & BALANCED TYPES	EXCEL
8020-611-2M	E	J	P&CSD	ISS - SAFETY RELIEF VALVES (CALCULATION)	EXCEL
8020-611-3	E	J	P&CSD	ISS - PRESSURE RELIEF VALVES CONVENTIONAL & BALANCED TYPES	EXCEL
8020-611-3M	E	J	P&CSD	ISS - SAFETY RELIEF VALVES (CALCULATION)	EXCEL
8020-612-1	E	J	P&CSD	ISS - SAFETY RELIEF VALVE S PILOT OPERATED	EXCEL
8020-612-2	E	J	P&CSD	ISS - SAFETY RELIEF VALVE S PILOT OPERATED	EXCEL
8020-612-3	E	J	P&CSD	ISS - SAFETY RELIEF VALVE S PILOT OPERATED	EXCEL
8020-613-1	E	J	P&CSD	ISS - PRESSURE - VACUUM RELIEF VALVES	EXCEL
8020-613-2	E	J	P&CSD	ISS - PRESSURE - VACUUM RELIEF VALVES	EXCEL

Appendix E – Engineering Forms List (Cont'd)

Form #	Size	Index	Prop. Dept	Title	Format
8020-617	E	J	P&CSD	ISS - FLAME MONITORING SYSTEMS	EXCEL
8020-623-1	E	J	P&CSD	ISS - PROGRAMMABLE CONTROLLER BASED ESD SYSTEMS	EXCEL
8020-623-2	E	J	P&CSD	ISS - PROGRAMMABLE CONTROLLER BASED ESD SYSTEMS	EXCEL
8020-625-1	E	J	P&CSD	ISS - MACHINERY PROTECTION SYSTEM	EXCEL
8020-625-2	E	J	P&CSD	ISS - MACHINERY PROTECTION SYSTEM	EXCEL
8020-625-3	E	J	P&CSD	ISS - MACHINERY PROTECTION SYSTEM	EXCEL
8020-625-4	E	J	P&CSD	ISS - MACHINERY PROTECTION SYSTEM	EXCEL
8020-625-5	E	J	P&CSD	ISS - MACHINERY PROTECTION SYSTEM	EXCEL
8020-625-6	E	J	P&CSD	ISS - MACHINERY PROTECTION SYSTEM	EXCEL
8020-634	E	J	P&CSD	ISS - LOCAL ZV CONTROLS	EXCEL
8020-711-1	E	J	P&CSD	ISS - GLOBE / ANGLE CONTROL VALVES	EXCEL
8020-711-2	E	J	P&CSD	ISS - GLOBE / ANGLE CONTROL VALVES	EXCEL
8020-712-1	E	J	P&CSD	ISS - BALL CONTROL VALVES	EXCEL
8020-712-2	E	J	P&CSD	ISS - BALL CONTROL VALVES (SIZING AND NOISE CALCULATIONS)	EXCEL
8020-713-1	E	J	P&CSD	ISS - BUTTERFLY/ROTARY PLUG CONTROL VALVES	EXCEL
8020-713-2	E	J	P&CSD	ISS - BUTTERFLY/ROTARY PLUG CONTROL VALVES (SIZING & NOISE CALC)	EXCEL
8020-716	E	J	P&CSD	ISS - PNEUMATIC ACTUATORS (ON-OFF SERVICE)	EXCEL
8020-717	E	J	P&CSD	ISS - HYDRAULIC VALVE ACTUATORS	EXCEL
8020-718	E	J	P&CSD	ISS - ELECTRIC MOTOR OPERATED VALVE ACTUATORS	EXCEL
8020-815-1	E	J	P&CSD	ISS – ANNUNCIATORS	EXCEL
8020-815-2	E	J	P&CSD	ISS – ANNUNCIATORS	EXCEL
8020-825	E	J	P&CSD	ISS - ELECTRO-MECHANICAL RELAYS	EXCEL
8020-827	E	J	P&CSD	ISS - SOLENOID OPERATED VALVES	EXCEL
8020-828	E	J	P&CSD	ISS - TRANSDUCERS (SIGNAL CONVERSION)	EXCEL
8020-830	E	J	P&CSD	ISS - PROGRAMMABLE CONTROLLER	EXCEL
8020-831	E	J	P&CSD	ISS - INSTRUMENTATION FOR PACKAGED UNITS	EXCEL
8020-913	E	J	P&CSD	ISS - INSTRUMENTATION AND THERMOCOUPLE CABLE	EXCEL
8110	A	P	CSD	LOGIC DIAGRAM - SIZE: 'A'	DGN
8111	B	J	ENG	INDEX SHEET – INSTRUMENT LOOP DIAGRAM (I.L.D.) - SIZE: 'B'	DGN
8112	D	H	CSD	PAINTING SPECIFICATION	EXCEL
8114	A	P	CSD	ELECTRICAL LOAD TABULATION	DGN
8117M-1	E	K	CSD	DATA SHEET - CENTRIF. FLUOROCARBON REFRIGERATION UNITS	EXCEL
8117M-2	E	K	CSD	DATA SHEET - CENTRIF. FLUOROCARBON REFRIGERATION UNITS	EXCEL
8118	D	A	CSD	DATA SHEET – HYDROSTATIC TEST REPORT - SUBMARINE PIPELINES	EXCEL
8130-1	E	K	CSD	DATA SHEET - SIDE ENTRY MIXER	EXCEL
8130-2	E	K	CSD	DATA SHEET - SIDE ENTRY MIXER	EXCEL
8130M-1	E	K	CSD	DATA SHEET - SIDE ENTRY MIXER	EXCEL
8130M-2	E	K	CSD	DATA SHEET - SIDE ENTRY MIXER	EXCEL
8150-1	E	K	CSD	DATA SHT. - PACKAGED INTEGRALLY GEARED CENT. AIR COMPRESSOR	EXCEL
8150-2	E	K	CSD	DATA SHT. - PACKAGED INTEGRALLY GEARED CENT. AIR COMPRESSOR	EXCEL

Appendix E – Engineering Forms List (Cont'd)

Form #	Size	Index	Prop. Dept	Title	Format
8150-3	E	K	CSD	DATA SHT. - PACKAGED INTEGRALLY GEARED CENT. AIR COMPRESSOR	EXCEL
8150-4	E	K	CSD	DATA SHT. - PACKAGED INTEGRALLY GEARED CENT. AIR COMPRESSOR	EXCEL
8150-5	E	K	CSD	DATA SHT. - PACKAGED INTEGRALLY GEARED CENT. AIR COMPRESSOR	EXCEL
8150-6	E	K	CSD	DATA SHT. - PACKAGED INTEGRALLY GEARED CENT. AIR COMPRESSOR	EXCEL
8150M-1	E	K	CSD	DATA SHT. - PACKAGED INTEGRALLY GEARED CENT. AIR COMPRESSOR	EXCEL
8150M-2	E	K	CSD	DATA SHT. - PACKAGED INTEGRALLY GEARED CENT. AIR COMPRESSOR	EXCEL
8150M-3	E	K	CSD	DATA SHT. - PACKAGED INTEGRALLY GEARED CENT. AIR COMPRESSOR	EXCEL
8150M-4	E	K	CSD	DATA SHT. - PACKAGED INTEGRALLY GEARED CENT. AIR COMPRESSOR	EXCEL
8150M-5	E	K	ENG	DATA SHT. - PACKAGED INTEGRALLY GEARED CENT. AIR COMPRESSOR	EXCEL
8150M-6	E	K	CSD	DATA SHT. - PACKAGED INTEGRALLY GEARED CENT. AIR COMPRESSOR	EXCEL
8172	E	E	CSD	DATA SHEET - PLATE AND FRAME TYPE HEAT EXCHANGER	EXCEL
8173	E	A	CSD	SAFETY INSTRUCTION SHEET - PLATE TYPE HEAT EXCHANGERS	EXCEL
9336	E	A	CSD	SAFETY INSTRUCTION SHEET – COMPRESSORS	EXCEL
9524	E		P&CSD	PROCESS DESIGN DATA SHEET – PACKING	EXCEL
9524-1	E		P&CSD	PROCESS DESIGN DATA SHEET - STREAM COMPOSITION	EXCEL
9524-2	E		P&CSD	PROCESS DESIGN DATA SHEET – TRAYS	EXCEL
9527	D	D	CSD	PRESSURE VESSEL DATA SHEET.	DGN
9541	E	E	CSD	DATA SHEET - ELECTRIC HEAT EXCHANGER	EXCEL
9543	D	F	P&CSD	DATA SHEET - PRESSURE RELIEF DEVICE - FLARE SYSTEM	EXCEL
9544	D	F	P&CSD	FLARE LOAD SUMMARY	EXCEL
9547	E	F	P&CSD	DATA SHEET - FLARE TIP	EXCEL
9548	E	F	P&CSD	SPECIFICATION SHEET – FLARES	EXCEL
9549	E	F	PCSD	DATA SHEET - FLARE KNOCK OUT/SEAL DRUM.	EXCEL
9550-1	E	F	CSD	DATA SHEET - WATER TUBE BOILER	EXCEL
9550-2	E	F	CSD	DATA SHEET - WATER TUBE BOILER	EXCEL
9561	E	F	P&CSD	DATA SHEET - FLARE PROCESS CONDITION	EXCEL
9562	E	F	P&CSD	DATA SHEET - FLARE UTILITIES	EXCEL
9570	E	A	CSD	SAFETY INSTRUCTION SHEET - WATER TUBE BOILERS	EXCEL
9580	E	D	CSD	DATA SHEET - API 620 STORAGE TANK	EXCEL
9594	E		ENG	DRAWING COMPLETION CERTIFICATE (DCC)	WORD
9597-1	E		CSD	NONMATERIAL REQUIREMENTS FOR BATTERY CHARGER/RECTIFIER	EXCEL

* The index of face sheets to follow the same discipline (index) for which the face sheet has been made.