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PROCEDURE MANUAL

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1. SCOPE

This manual covers the handling of specifications and other documents in the **execution of basic design** in conformance with the basic design manual, the organization of the process engineering department and the execution of process engineering.

The scope of work for Samsung as contractor on an engineering project can differ considerably from project to project. This execution procedure considers a "typical" project in which the "Process Design", a process design package, has been prepared by a process licensor or the client, and Samsung, as contractor, is responsible for the "Basic Design", a basic engineering package. The split of scope between the Process Design and Basic Design will vary from project to project. In some cases, Samsung as contractor will also be responsible for the Process Design.

2. DEFINITION

2.1 Process Design

"Process Design" means the following work based on the design basis provided by the client.

- Preparation of process flow diagrams
- Preparation of heat and weight balances
- Preparation of equipment process data sheets
- Calculation of preliminary utility requirements

At this stage, the so called "Conceptual Design" will be executed; namely, the type of reactors, the type of trays or packings, the most suitable operating conditions, thermal recovery methods, etc. are studied, based on which the process flow is established. In this case, such factors as the following must be considered:

- Operating cost
- Investment cost
- Operability
- Flexibility
- Safety

2.2 Process Specifications

"Process Specifications" mean information in which the results of the process design are incorporated. The typical contents thereof are as follows:

- Design basis
- Process flow diagram (Including control system)
- Process description

- Feed and product specifications

- Heat and material balances (Stream data)

- Operating conditions
- Equipment process data sheet

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- Preliminary utility summary

2.3 Basic Design

"Basic Design" means the design work to be carried out by the process engineer. When the process design is carried out by the contractor, basic design elements are inevitably involved.

Therefore, the process and basic design in this case are collectively referred to as "Basic Design".

In other cases, the contractor executes the basic design based on process design information provided by the client or process Licensors. The typical contents of a "Process Design" are described above in Section 2.2. However, as mentioned in Section 1, the scope of the "Process design" can differ from project to project and the client or process Licensors. May sometimes omit some items of information. This may then entail additional process design work by the contractor.

The information regarding process design be provided by the client or process Licensors.

The contractor will normally not be required to take responsibility for this information; however, based on the contract, the contractor is required to clarify the extent to which such information is to be provided by the client/process licensors. It is deemed that the work not covered by this information is within the scope of the contractor.

Following the completion of the process specifications mentioned in Section 2.2, the following work must be carried out:

- Process calculation for equipment
- Hydraulic calculations
- Process calculations for instruments
- Conceptual plot plan
- Safety and environmental protection

The documents mentioned below are prepared in the above sequence and distributed to the process engineering department or project division upon approval by the client, if any, for carrying out the detail design.

The basic design thus aids the preparation of data for the detail design and quotation inquiries to be issued to manufacturers, and also for test run preparations.

These include:

- P & I diagrams
- Utility flow diagrams
- Proposed plot plan
- Pressure vessel skeletons
- Rotary machine data sheets
- Instrument data sheets

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- Off-site facility basic data sheet
- Operation manuals

The execution flow within the scope outlined above is as shown in Fig. 2-1.

Regarding contents of basic design package, refer to manual of "Basic Design Package" stipulated in Section 1-3.

3. DOCUMENTS

Since project specifications or tender documents furnished by the client are to be followed as a design basis, all engineers assigned to the project must study them.

Especially the key person must pick out all important requirements indicated therein and list up those pertaining to the basic design.

In usual cases, the project specifications and engineering practice furnished by the client take precedence over the contractor's design manuals.

However, in many cases, changes and revisions are made in the project specifications and/or engineering practice in the course of the project work.

Changes and revisions, if made, must be recorded in the form of memorandum or minutes of meetings to avoid confusion in the future.

Meanwhile, the proposal submitted by the contractor constitutes a part of the contract after award of contract.

Hence, if any deviations from it are required in individual cases, the client's prior approval must be obtained as a rule.

4. ORGANIZATION

The process department is responsible to the client and project division for the preparation of specifications.

A Lead Process Engineer is assigned as a key person to each project. The responsibilities of the Lead Process Engineer and Team Manager are as follows:

1.1. Lead Process Engineer:

The Lead Process Engineer is the leader of the process-engineering group for the project who must coordinate with the project-engineering group and the design-engineering group. He is responsible for ensuring that the entire process/basic design work is being done according to unified concepts as defined by the client and must have a thorough grasp of the status of all work being carried out, at all times.

1.2. Team Manager:

The Team Manager is responsible for checking the process design provided by the process engineers, under the leadership of the lead process engineer. In addition, the Team Manager must exercise schedule control.

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5. EXECUTION

5.1 General

Project teams are organized in the respective project divisions and each specialty department assigns their key persons to the projects, which are executed under the matrix system.

The process engineering group proceeds with the process design under the coordination of the project manager and engineering manager.

Generally, the execution procedure is as shown on Fig. 2-1.

Value analysis must be carried out to complete P & I diagrams, and the results of the analysis must be reflected therein.

The basic purposes of value analysis are to eliminate so-called "golden plates" and to check for conformance to the design philosophy.

SECL design philosophy can be paraphrased as follows:

- The facilities must have high reliability.
- The facilities must be easy to operate.
- Safety of the facilities must be assured.
- Maintenance of the facilities must be easy.
- Environmental and ecological requirements must be fully satisfied.
- Operating costs must be minimal.
- Layout of the facilities must be simple and of good appearance.
- Energy conservation must be considered.

After completion of the value analysis, entries are made in respective data sheets, and drawings are prepared. Then, the process specifications are issued from the process department. If necessary, the basic design package must be prepared. Since it is helpful in the following project engineering, its preparation is recommendable.

5.2 Cooperation with Clients

This section discusses the modes of cooperation with clients and SECL experience in front end engineering. Although various interpretations may be ascribed to the three major elements comprising a front end engineering package and their contents, the following interpretation is adopted here.

Front End Engineering Package

(1) Design basis

Description of feed properties, products specifications and other specific requirements and basic engineering design data.

(2) Process design package

Basic process flow diagrams, heat and weight balances and other specific requirements for reactors.

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(3) Basic design package

Sketches of vessels and data sheets for equipment and instruments:

P & I diagrams

Plot plans

Utilities summaries

The modes of carrying out front end engineering, based on the above interpretation, in collaboration with clients can be classified into the three cases shown in Fig. 5-1.

Explanation of Fig. 5-1

Case A: This case involves the preparation of a process design package by the contractor upon receipt of the client's design basis as well as the contractors' independent execution of the entire basic design, during which period no specific support from the client is required. The following are cases under this category:

<u>Client</u>	<u>Project</u>	<u>Completion</u>
	<u>[Later]</u>	

Case B: In this case, the client prepares a process design package comprising flow sheets, heat and weight balances and so on. Our view is that this case would be suitable where the clients' intention can not be fully clarified solely from the design basis or where modification or finalization of the design basis is required in the process design stage. Therefore, it is necessary for SECL personnel to be stationed at the client's home office to participate with the client in the task concerned, from the initial stages of the front end engineering, to reflect the client's intentions fully in the basic design. SECL has much experience in this mode of cooperation on jobs performed for major oil companies.

The following are recent cases under this category:

<u>Client</u>	<u>Project</u>	<u>Completion</u>
	<u>[Later]</u>	

Case C: Here, the front end engineering is carried out by the clients themselves or by other engineering companies, and the contractor's task involves only the verification of the front

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end engineering during the detailed design stage.

SECL recent experience in this type of work is as follows:

<u>Client</u>	<u>Project</u>	<u>Completion</u>
	<u>[Later]</u>	

5.3 Handling of Licensed Processes

The manner of handling licensed processes is generally dictated by process licensors. According to SECLs experience, the following two cases are common practice.

Case 1 ... UOP Process

In almost all projects, UOP produces the so-called "Schedule-A Package". Therefore, SECLs work in the front end engineering stage is limited to thermal rating of heat exchangers and hydraulic balance calculations, based upon plot plans.

Case 2 ... Processes other than UOPs

In this case, process licensors generally produce the following basic process information:

- Operating conditions of reactors
- Mol. balance around reactors
- Sketches of reactors
- Specific requirements, if any

Based on this information., SECL develops the process design for the fractionation section and finalizes front end engineering for all sections including the reactor section.

However, where SECL executes modification or revamping of existing units, SECL reduces front end engineering package even for UOP processes under agreements with clients. Thus, this case corresponds to Case 2 mentioned above.

The following table indicates the major jobs executed under Case 2:

<u>Client</u>	<u>Licensor</u>	<u>Unit</u>	<u>Year</u>
		<u>[Later]</u>	

6. DISTRIBUTION OF SPECIFICATIONS

In the case of distribution from process department (PE), documents must be passed through the routes

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shown on Table 6-1 to avoid unnecessary work in the receptive divisions.

Basically, documents are distributed (passed) through one writing route (system).

The symbols used in Table 6-1 mean the following:

- ◎ Reproducible (original) copies shall be distributed.
- 0 Print (Zerox or blue-line) copies shall be distributed.

For instance, in the case of 4.2 (vessels) in Table 6-1, documents must be distributed as follows:

■ Process Dept. (PE) :

Process data are entered in the blank form specified in the Section 1-3 "Basic Design Package".

Original copies are sent to the equipment design department. Print copies are sent to the project division.

■ Equipment Design:

Mechanical data are shown in the original copies received from PE and the originals are sent to the project division.

■ Project Division:

After assignment of specification numbers, print copies are distributed and the originals are sent to the Project Supporting & Administration Division where they are kept in file.

7. FILING SYSTEM

Calculation sheets must be kept in file under the classifications of the categories described in the Section 1-3 "Basic Design Package".

Since the numbers of calculation sheets are large, it is necessary that calculation sheets should be prepared in a simple form.

The periods of data storage shall be as shown below.

	Until Completion of Engineering	Until Completion of Performance Test	Permanent Storage
a. Basic design package			x
b. Calculation sheet			x
c. Computer input sheet	x		
d. Computer input card	x		
e. Computer output		x	
f. Interoffice correspondence		x	
g. Notes and		x	

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memorandum			
h. Minutes of meetings		x	
i. Letters and telexes		x	

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Table 6-1 Distribution Routes of Documents Prepared by PE

INDEX	ISSUE	RECEIVE					ORIGINAL KEPT IN FILE
		PROJECT DIV.	EQUIPMENT DESIGN	FURNACE DESIGN	ELECT. & INSTRU.	ROTARY MACHINERY	
1.0 BASIC DESIGN							
1.1 Process Design Basis	PE	◎					Project Supporting and Administration Div.
1.2 Basic Engineering Design Data	Project Div.	○	○	○	○	○	"
2.0 DESCRIPTION OF PROCESS							
2.1 Process Description	PE	◎					Project Supporting and Administration Div.
2.2 Process Flow Diagram	PE	◎		○	○		"
3.0 UTILITY AND EFFLUENTS							
3.1 Utilities	PE	◎					Project Supporting and Administration Div.
3.2 Catalysts	PE	◎					"
3.3 Chemicals	PE	◎					"
3.4 Effluents	PE	◎					"
3.5 Flare Loading	PE	◎					"

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		PROJECT DIV.	EQUIPMENT DESIGN	FURNACE DESIGN	ELECT. & INSTRU.	ROTARY MACHINERY	
4.0 EQUIPMENT							
4.1 Equipment List	PE	◎					Project Supporting and Administration Div.
4.2 Vessels	PE	○	◎				"
4.3 Heat Exchangers	PE	○	◎				"
4.4 Fire Heaters	PE	○		◎			"
4.5 Rotary Machinery	PE	○				◎	"
4.6 Miscellaneous Equipment	PE	◎					"
5.0 INSTRUMENTS	PE	○			◎		Project Supporting and Administration Div.
6.0 PIPING							
6.1 Piping Classification	PE	◎					Project Supporting and Administration Div.
6.2 Insulation Thickness Table	PE	◎					"

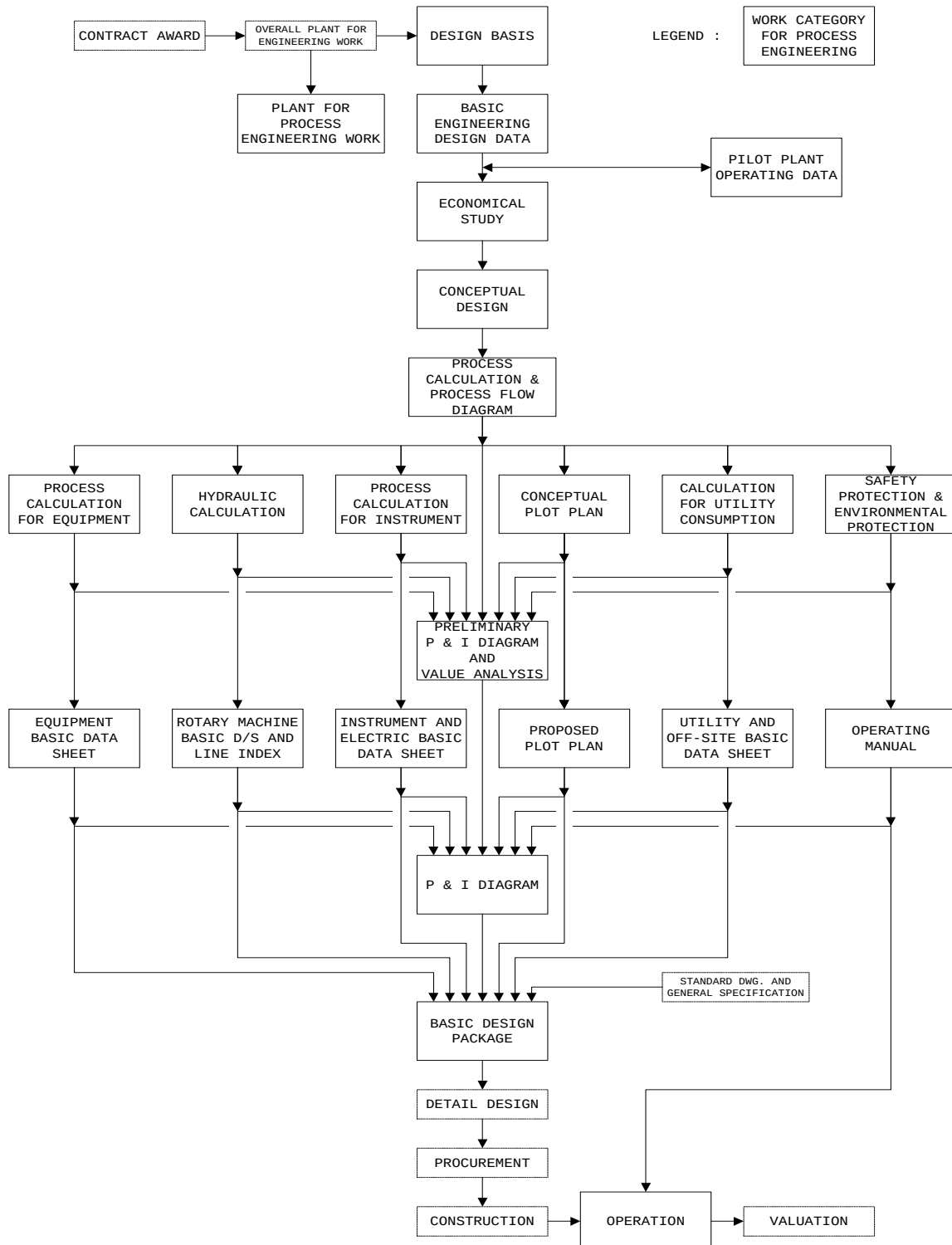
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		PROJECT DIV.	EQUIPMENT DESIGN	FURNACE DESIGN	ELECT. & INSTRU.	ROTARY MACHINERY	
7.0 DRAWINGS							
7.1 Piping and Instrument diagram	PE	◎					Project Supporting and Administration Div.
7.2 Plot Plan	PE	◎					"
7.3 Hazardous Area Classification	PE	◎					"
7.4 Tie-in Diagram	PE	◎					"

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Fig. 2-1 Front End Engineering Execution Flow



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Fig. 5-1 Front end Engineering Cooperation with Client
[LATER]

8. 작성내력

개정번호	개 정 일 자	개정 페이지	개 정 사 유
0	98.04.17	전 페이지	신규 제정 - 작성부서 : 공정팀 - 작성자 : 박종현 임종은 - 검토자 : 이봉일 조석범 노재철 - 승인자 : 오성국
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