

SPD0012ERN
PROCESS DESIGN MANUAL

QUALITY CONTROL AND ASSURANCE

REV. : [3](#)

DATE : [2013. 06. 25](#)



**SAMSUNG
ENGINEERING**

SAMSUNG ENGINEERING CO., LTD.

 SAMSUNG ENGINEERING	PROCESS DESIGN MANUAL QUALITY CONTROL AND ASSURANCE	SPD0012ERN
		REV. : <u>3</u>
		PAGE i OF i

<u>CONTENTS</u>		PAGE
1. SCOPE	-----	3
2. DEFINITION	-----	3
2.1 Quality Control and Assurance	-----	3
2.2 Basic Design Quality	-----	3
3. PROCEDURE	-----	4
3.1 Safety	-----	4
3.2 Process Performance	-----	4
3.3 Design Specification	-----	4
3.4 Economical Design	-----	4
4. REVIEW ITEMS	-----	5
4.1 Safety	-----	5
4.1.1 Initial Design Stage	-----	5
4.1.2 Basic Design Completion Stage	-----	5
4.2 Process Performance	-----	5
4.2.1 Initial Design Stage	-----	5
4.2.2 Process Design Stage	-----	6
4.3 Design Specification	-----	6
4.3.1 Initial Design Stage	-----	6
4.3.2 Whole Design Stage	-----	6
4.4 Economical Design	-----	6
4.4.1 Initial Design Stage	-----	6
4.4.2 Process Design Stage	-----	7
4.4.3 Basic Design Stage	-----	7
5. REVISION HISTORY	-----	9
FIGURE		
Fig.4-1. Front End Engineering Execution Flow	-----	8

	PROCESS DESIGN MANUAL QUALITY CONTROL AND ASSURANCE	SPD0012ERN
		REV. : <u>3</u>
DATE : <u>2013.06.25</u>		PAGE 1 OF 7

1. SCOPE

This manual covers quality control and assurance in the basic design.

2. DEFINITION

2.1 Quality Control and Assurance

- (1) Quality Control in the basic design means every activity to be developed at the basic design stage in order to settle and embody the quality specifications to be satisfied by the plant.
- (2) Quality Assurance involves Quality Control activities to especially ensure that there are no failures with respect to meet the quality requirements of society and the client.

2.2 Basic Design Quality

Basic design quality is divided into the following four items.

- (1) Safety
- (2) Process performance
- (3) Design specification
- (4) Economical design

Quality Control activities are developed for all the items, while Quality Assurance activities are developed principally for Items (1) and (2).

Each item is detailed below.

(1) Safety

Safety includes measures to prevent explosion, fire, adverse effects to workers' health, and environmental pollution.

(2) Process performance

Matters specified in the guarantee contract,
Capacity,
Yield or feedstock consumption,
Product specifications,
Utility consumption, etc.

(3) Design specification

- o Contents of the agreement with the client prior to design activities, such as applicable laws, regulations, codes, and standards, life of plant, operability, etc.
- o In addition, quality of design outputs necessary to proceed with the detailed design smoothly.

(4) Economical design

- o Optimum design in view of construction and operation costs.
- o Prevention of unnecessary over-design (excess quality).
- o In addition, pursuit of efficient engineering.

	PROCESS DESIGN MANUAL QUALITY CONTROL AND ASSURANCE	SPD0012ERN
		REV. : <u>3</u>
		PAGE 2 OF 7

3. PROCEDURE

3.1 Safety

(1) Initial design stage

The basic policy for safety design is determined through full understanding of the nature of the plant to be designed, and also full investigation of the circumstances of the plant.

(2) Basic design completion stage

Overall design review is conducted to ensure that considerations for safety are incorporated into the design specifications principally included in P & I diagrams.

3.2 Process Performance

(1) Initial design stage

The basic policy for process design is determined by confirming the background of the verification of guarantee items and figures as process performance and also fully considering the risks resulting from performance guarantee.

(2) Process design stage

Design review is conducted based on the process flow diagram and the results of process simulation as to what basic data the design calculation is based on, what margin is afforded between the calculated values and guarantee figures, and what action could be taken when guarantee figures are not satisfied.

3.3 Design Specification

(1) Initial design stage

A basic design policy for each design item is determined according to the characteristics of the project.

(2) Whole design stage

Each design output is reviewed accordingly.

3.4 Economical Design

(1) Initial design stage

A priority study policy for economical design is determined by understanding what section of the plant to be designed contributes to the economy most.

(2) Process design stage

Design review is conducted to ensure that the process flow and operating conditions are optimized.

(3) Basic design stage

The equipment design specifications, P & I diagrams, and plot plan are reviewed to eliminate over-design.

(4) Whole design stage

Design audit and control are performed to efficiently execute the engineering work.

	PROCESS DESIGN MANUAL QUALITY CONTROL AND ASSURANCE	SPD0012ERN
		REV. : <u>3</u>
DATE : <u>2013.06.25</u>		PAGE 3 OF 7

4. REVIEW ITEMS

The relation between the Quality Control/Quality Assurance procedures described in Chapter 3 and the practical engineering execution is described as concrete review items by using Fig. 4-1 "Front End Engineering Execution Flow".

4.1 Safety

4.1.1 Initial Design Stage

- (1) Is the nature of the plant specified in respect to the degree of danger in the plant operating conditions (e.g., high temperature and pressure), the reaction in the reactors (e.g., runaway reaction), and the toxicity and explosiveness?
- (2) Are the special operating conditions other than normal operating conditions, such as sulphurization, emergency depressurization catalyst regeneration, chemical cleaning, etc. specified?
- (3) Are measures against the coincidence of emergency with other units considered in the design?
- (4) Is the relation between the design basis for supporting facilities (flare, utility, flushing, and slop systems) and that for the process units described?

4.1.2 Basic Design Completion Stage

- (1) Is safety considered in the policy of standby and the driver selection philosophy for rotary machines?
- (2) Are the effluent summary and environmental data described properly?
- (3) Does the emergency sequence logic pose no problem in every operating case, and is the logic clearly defined?
- (4) Are all the process conditions incorporated into the material selection?
- (5) Do the design conditions for all equipment have a proper margin from the viewpoint of normal/emergency operation?

4.2 Process Performance

4.2.1 Initial Design Stage

- (1) Are the main and alternate operation cases specified in the design basis?
- (2) Are the feedstock properties and utility and battery limit conditions clearly defined?
- (3) Is there any discrepancy between the product specifications and analysis methods?

 SAMSUNG ENGINEERING	PROCESS DESIGN MANUAL QUALITY CONTROL AND ASSURANCE	SPD0012ERN
		REV. : <u>3</u>
		PAGE 4 OF 7

4.2.2 Process Design Stage

- (1) Is the physical property calculation method used in the process simulation, highly reliable?
- (2) Is the design margin/contingency for each item of equipment adequate in every operation case?
- (3) Has the data on which performance assurance is based, been verified by past records and experimental data?
- (4) Has any equipment having low durability and efficiency been selected?
- (5) Is the instrumentation system capable of monitoring the process performance daily?

4.3 Design Specification

4.3.1 Initial Design Stage

- (1) Are the scope of specially applicable codes and client's standards specified? Are the contents of these codes and standards fully understood?
- (2) Are the client's requirements specified as to the special turndown incident to the bypass operation of the unit, and the unit operability such as hot/cold feed?
- (3) Is the equipment subject to on-stream maintenance or requiring interchangeability, specified?
- (4) Is the design base necessary to concretely design the unit according to each design item, defined?

4.3.2 Whole Design Stage

- (1) Have the results of analyzing the past troubles been applied to this design?
- (2) Are all the design specifications and drawings appropriate?
- (3) Is smooth start-up/normal/shutdown operation ensured?
- (4) Has the most suitable instrumentation system which is capable of accommodating every operation case, been adopted?

4.4 Economical Design

4.4.1 Initial Design Stage

- (1) Are economical design items listed up in the unit to be designed?
- (2) Are the evaluation base (utility cost, product cost, etc.) and technique suitable for the unit?

	PROCESS DESIGN MANUAL QUALITY CONTROL AND ASSURANCE	SPD0012ERN
		REV. : <u>3</u>
		PAGE 5 OF 7

4.4.2 Process Design Stage

- (1) Is the adopted process flow consistent with past economical studies and experience?
(Combination of towers, number of tower trays and reflux, etc.)
- (2) Is the operability in start-up/normal/shutdown operation sacrificed for the economical design?
- (3) Do the material selection criteria specify materials proper for the design conditions?
(Is unnecessary over-specification eliminated?)
- (4) Are the pressure difference, design of heat exchangers and the pursuit of their interchangeability considered?

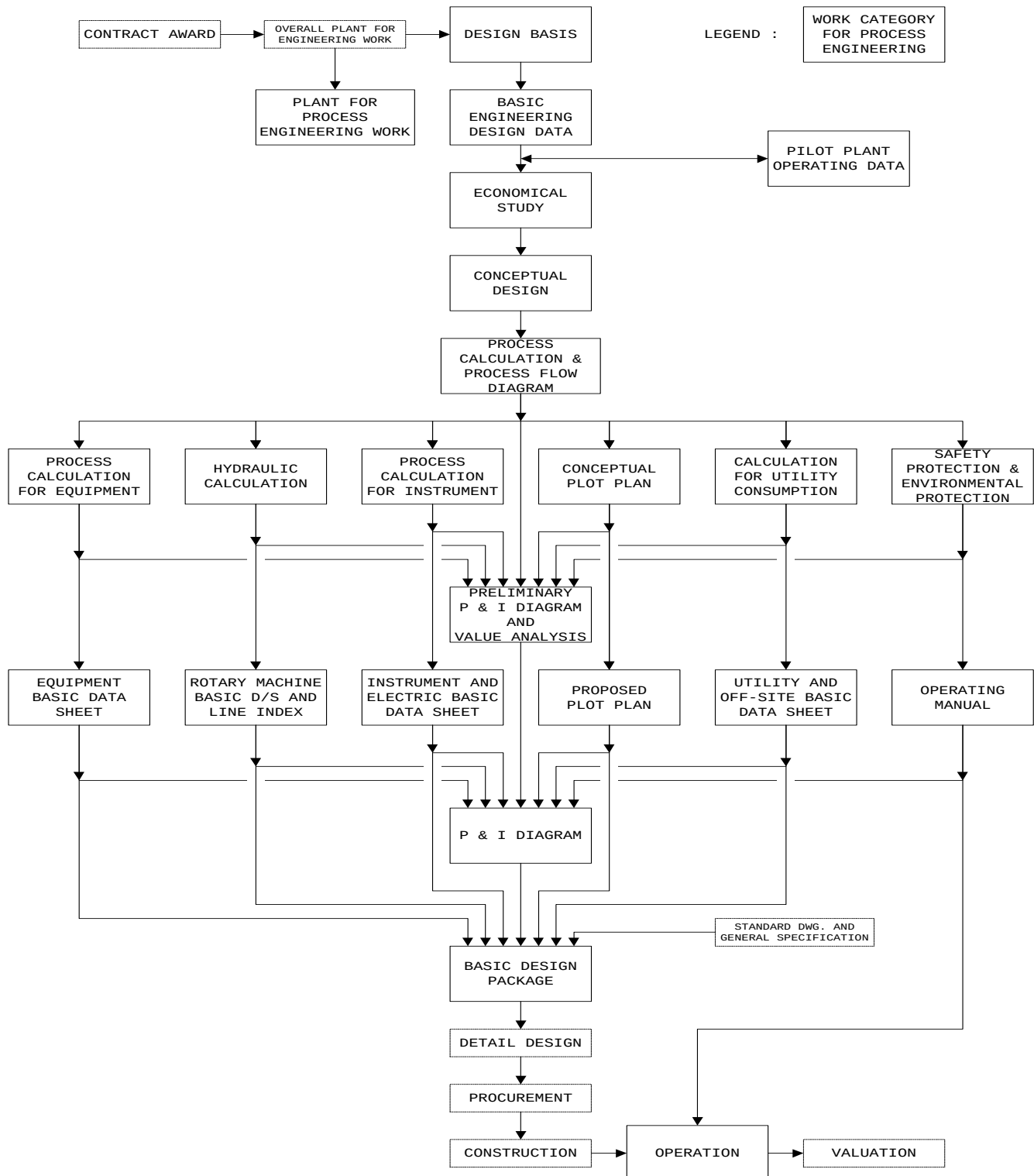
4.4.3 Basic Design Stage

- (1) Is the plot plan economical?
- (2) Is there any problem of over-design with the instrumentation and analyzer systems for monitoring the process performance?
- (3) Are there any unnecessary piping and valves installed?
Is the size of piping of large diameter proper?
- (4) Is there any problem of over-design with costly equipment?

	PROCESS DESIGN MANUAL QUALITY CONTROL AND ASSURANCE	SPD0012ERN
		REV. : <u>3</u>
		PAGE 6 OF 7

DATE : 2013.06.25

Fig. 4-1 Front end Engineering Execution Flow



	PROCESS DESIGN MANUAL QUALITY CONTROL AND ASSURANCE	SPD0012ERN
		REV. : <u>3</u>
		PAGE 7 OF 7
DATE : <u>2013.06.25</u>		

5. REVISION HISTORY

개정번호	개 정 일 자	개정 페이지	개 정 사 유
0	98.4.17	전 페이지	신규 제정 - 작성부서 : 공정팀 - 작성자 : 박종현 임종은 - 검토자 : 이봉일 조석범 노재철 - 승인자 : 오성국
1	03.7.16	전 페이지	수정 - 작성부서 : 시스템설계팀 - 수정자 : 이종민 - 검토자 : 이의덕 노재철 박종현 - 승인자 : 정찬설
2	2010.11.20	전 페이지	Document number revision - 작성자 : 김진일 - 검토자 : 헨리성, 노재철, 곽홍해, 오명환, 홍성은 - 승인자 : 이의덕
<u>3</u>	<u>2013.06.25</u>	<u>ALL PAGES</u>	<u>- Old format (Samsung Logo) is replaced</u> <u>- Written at Process Eng'g Dept</u> <u>Written by : S.K.JEON</u> <u>Checked by : I.H.HWANG</u> <u>Approved by : S.B.LEE</u>