

**SPD0013ERN**

**PROCEDURE MANUAL**

**DESIGN BASIS DOCUMENTS**

REV. : 3

DATE: 2013.07.09



**SAMSUNG  
ENGINEERING**

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## 1. SCOPE

This manual covers the preparation of the Design [Basis documents that](#) must be completed prior to starting the basic design.

## 2. DEFINITION

### 2.1. Classification and Definition

As a general [rule, a project's Design Basis documents can be classified into the following three categories:](#)

- (1) General Design Basis
- (2) Process Design Basis ([onsites](#))
- (3) Facility Design Basis ([offsites](#))

The term "General Design Basis" [refers](#) to a document [that specifies](#) the configuration of a [plant and its overall design requirements](#). The term "Process Design Basis" [refers](#) to a document intended to specify [the performance of the process units](#). The term "Facility Design Basis" refers to a document intended to specify the performance of the offsite [facilities](#).

### 2.2. Nature

The Design Basis [documents](#) are important for the design of the entire plant, individual processes, and [supporting](#) facilities. The Design Basis [documents](#) must [define the](#) basic requirements for [the plant, individual processes, and supporting facilities](#). The Design Basis [documents](#) should be prepared by the contractor [with input from the client](#) and then approved by the client prior to any basic design work. A Design Basis can be used for [specifying requirements](#) to a process licensor and/or a packaged unit vendor.

## 3. DOCUMENTS RELATED TO DESIGN BASIS

### 3.1. General

The following documents are related to the Design Basis:

- (1) [Client](#) Design Philosophy
- (2) Basic Engineering Design Data (BEDD)
- (3) Economic Study Basis
- (4) [Client](#) Design Standards and Practices

The definitions and purposes [of these documents](#) differ from each other, as discussed below.

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### 3.2. [Client](#) Design Philosophy

#### 3.2.1. Definition

The term "[Client](#) Design Philosophy" refers to a document intended to specify [the](#) client's ideas and [objectives in regard to plant engineering, which should be reflected in the engineering of all process plants](#). In this regard, the definition of "[Client](#) Design Philosophy" is different from the Design Philosophy discussed in the Basic Design Manual [SPD0005ERN](#).

#### 3.2.2. [General Features](#)

The [Client](#) Design Philosophy is [ideally a written document](#), prepared by the client (often with the assistance of a consultant), and then furnished to [Samsung as](#) contractor.

[The Client Design Philosophy is a basis document for our Design Basis documents and BEDD. Following are issues and concerns that may arise in incorporating this document into our own:](#)

- (1) [There may be client requests that are inconsistent with Samsung standards or project objectives. Such requests must be reviewed with the client, and resolved to the satisfaction of both parties in a timely manner.](#)
- (2) [Descriptions similar to those in the design bases, basic engineering design data, and the design standards are often included.](#)
- (3) [The Client Design Philosophy may itself be internally inconsistent. Such inconsistencies must be identified and amicably resolved.](#)
- (4) [Contractor's attitude toward the Client Design Philosophy:](#)

[Samsung as contractor is not under an obligation to produce a written Client Design Philosophy \(except when acting as the consultant\) if none is provided, our own Design Basis documents and BEDD will be used to describe the project basis. When it is provided, the contents of the Client Design Philosophy should be reviewed to ensure the capability of implementation into the engineering, procurement and construction work. If the contractor finds inconsistencies and/or unclear expressions then he must work with the client to correct and/or clarify these items.](#)

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### 3.3. Basic Engineering Design Data (BEDD)

#### 3.3.1. Definition

The term "Basic Engineering Design Data" [refers](#) to a document intended to specify requirements applicable in common to all process units and facilities.

#### 3.3.2. Content

Refer to [SPD0008ERN](#), Basic Engineering Design Data.

### 3.4. Economic Study Basis

#### 3.4.1. Definition

The term "Economic Study Basis" [refers](#) to a document intended to specify the basis for economic studies to be conducted.

#### 3.4.2. Content

A typical outline is given in [Table 1](#).

### 3.5. [Client](#) Design Standards and Design Practices

#### 3.5.1. Definition

The term "design standard" [or "design practice"](#) used herein refers to a document intended to specify [the procedures](#) to be applied throughout the entire engineering project.

#### 3.5.2. General features

The client's design standards and design practices must be followed, [where](#) specifically requested by the client. However, if any requirements of the client's standards are insufficient or incomplete, they must be supplemented, [through discussions with the client and then included in our standards](#).

If the client does [not](#) have design standards [or](#) design practices, the [Samsung standards should be applied. The standards will not address every necessary topic; therefore, the special features of each individual project must be taken into consideration. Approval for use of the Samsung standards, where necessary, should be obtained from the client.](#)

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## 4. CONTENTS OF THE DESIGN BASIS DOCUMENTS

### 4.1. General Design Basis

For the typical contents, see [Table 2](#).

Each General Design Basis shall consist of the following:

#### 4.1.1. Scope

The scope of the document shall be defined in this section; for example: "This document covers the General Design Basis of the "xxx" refinery which will be constructed at "yyy", and owned by "zzz" company.

#### 4.1.2. Configuration

- [The capacity of the plant and its configuration: minimum, maximum, normal & design.](#)
- [The process units and the associated facilities shall be described briefly](#)
- [Specified raw material feeds](#)
- [Specified final product rates and specifications](#)

#### 4.1.3. [The name of the following shall be listed:](#)

- Process units
- Material handling facilities
- Utility facilities

#### 4.1.4. Auxiliary facilities

The auxiliary facilities shall be specified. [The following is a list of auxiliary facilities, at a minimum, that should be provided:](#)

- Flare and blow-down facilities
- Wastewater treating facilities
- Fire fighting and protection
- Control room

#### 4.1.5. Plot plan layout requirements

The following items shall be described:

- Location of the construction site (Local map indicating the site may be attached)
- [Routes](#) or points for receiving feed stock, utilities intake and

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products transportation

- [Available](#) total area for the plant
- [Any](#) possible future expansion considerations
- [Basis](#) for spacing of units and equipment

4.1.6. [Operational Considerations/Requirements](#)

Items of interest include, but are not limited to, the following:

- Startup procedures
- Emergency operations
- Power failure
- Cooling water failure
- Instrument air failure
- Unit or facility failure
- Turndown ratio
- Design life

4.2. Process Design Basis (Onsite)

For the typical content, see [Table 3](#).

[Each Process Design Basis \(Onsite\) shall consist of the following:](#)

4.2.1. Scope

Refer to Section 4.1.1.

4.2.2. Process definition

(a) Configuration

(b) Describe the description of flow and the basic configurations of the process units. [Sometimes a simple block flow scheme is attached.](#)

(c) Operating cases

Clarify the operating cases that are due to variations in feed stock properties and operating conditions, etc. [The operating cases described here are the design cases.](#) A process flow diagram with heat and material balances shall be prepared for each design case.

4.2.3. Unit capacity

Specify the number of trains and each unit capacity.

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4.2.4. Feedstock properties

Specify the properties for each feedstock.

4.2.5. Product specifications

Specify the product specifications for each product.

4.2.6. Battery limit conditions

Clarify battery limit conditions between process units and offsite facilities. All incoming and outgoing streams shall be listed with the following contents.

- (a) Stream name
- (b) origin or destination
- (c) Pressure ([Minimum, Normal, & Maximum](#))
- (d) Temperature ([Minimum, Normal, & Maximum](#))
- (e) [Location and elevation](#)

4.2.7. Design considerations

Key design points, specifically related to the process, shall be described. The key items to be addressed depend on the individual process unit, and include, but are not limited to, the following:

- (a) General
  - Energy conservation
  - Safety measures
  - Catalyst life
  - Feasibility study requirements during design
- (b) Operating considerations
  - Continuous operation (Minimum Normal & Maximum)
  - Turndown operation
  - Shutdown operation
- (c) Mechanical considerations
  - Basis of material selection for special services
  - Turbine/motor selection preference
  - Sparing philosophy
- (d) Instrument and control system considerations

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(e) Future expansion considerations

(f) [Safety factors](#)

4.2.8. Supplementary design data

(a) Utility data, as required.

Special kinds of utility data used in the unit, if any. [This data is typically not shown](#) in the BEDD or are different from those described in the BEDD.

4.3. Facility Design Basis (Offsite)

For the typical content, see [Table 4](#).

[Each Facility Design Basis \(Offsite\) shall consist of the following:](#)

4.3.1. Scope

Refer to Section 4.1.1.

4.3.2. Facility definition

(a) Configuration

(b) Describe [the equipment and its function for each facility](#).

(c) Operational cases

- Clarify continuous, intermittent, and [if necessary](#), daytime operations.
- Specify [how the](#) operating cases [impact the design and capacity](#) of the facility.

4.3.3. Capacity [and/or Basis of Capacity](#)

[Specify the capacity and/or basis of capacity for each facility. An example of the basis of capacity of a facility is the following:](#)

(a) Annual shipping capacity

(b) Maximum Capacity

(c) Tanker size

4.3.4. Raw material properties

Specify material properties such as raw water, blending oil components etc. The chemicals used in the facility shall also be specified.

4.3.5. Specifications

Specify final product(s) specifications, treated water (filtered,

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coagulated, chlorinated, softened/ de-mineralized, de-aerated) specifications, quality of steam at boiler outlet, dew point of instrument air, purified nitrogen specifications, etc.

4.3.6. Battery limit conditions

Clarify battery limit conditions between facilities and process units/outside plant. Refer to Section 4.2.6.

4.3.7. Design considerations

Key design points specifically related to the facility shall be described. The key items to be addressed depend on the specific facility, and include, but are not limited to, the following:

(a) General

- Energy Conservation
- Safety measures
- Sparing of equipment and packaged units
- Feasibility study requirements during design

(b) Operating considerations

- Turndown operation
- Extent of remote control
- Extent of automation for chemical feeding, additive injection, products filling etc.
- [Safety factors](#)

(c) Mechanical consideration

- Material selection for special service
- Turbine/motor selection preference
- Sparing philosophy

(d) Instrument considerations

- Control system
- [Control room](#)
- [Field instruments](#)

(e) [Civil engineering considerations](#)

- [Clarify buried pipelines](#)

(f) Future considerations

|                                                                                                                  |                                                              |                                       |
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- [Pre-Investment for future capacity](#)

#### 4.3.8. Supplementary design data

If necessary, the following specific and detailed design data for facility design can be given as a supplement to the BEDD:

- Topological data
- Meteorological data
- Utility data

## 5. PRECAUTIONS TO BE TAKEN IN THE PREPARATION OF THE DESIGN BASIS

- Descriptions shall be concise and clear. Abstract and unclear descriptions shall be avoided.
- Requirements [covered](#) in other documents, such as design standards and design practices, shall not be included in the design basis [documents](#).
- [Design results shall not be included in the design basis documents.](#)
- [The design basis, once approved, shall be revised only as necessary. However, any requirements, which have to be changed after the development of the design, should be revised, without delay.](#)
- Capacities and product specifications, which are subject to performance guarantees, should be incorporated in the design basis [documents](#).

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## 6. TABLES AND FIGURES

[Table 1.](#) Contents of an Economic Study Basis

1. Scope
2. Investment Cost
  - 2.1. Plant Cost Factors
3. Revenue/Expense Data
  - 3.1. Operation Schedule
  - 3.2. Product Prices
  - 3.3. Raw Material Cost
  - 3.4. Utility Costs
  - 3.5. Maintenance Cost
  - 3.6. Personnel Cost
  - 3.7. Administration Cost
4. Financial Data
  - 4.1. Discount Rate
5. Evaluation Criteria

|                                                                                                                  |                                                    |                                       |
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[Table 2.](#) Contents of a General Design Basis

1. Scope
2. Configurations
3. Process Units
4. Material Handling Facilities
5. Utility Facilities
6. Auxiliary Facilities
7. Plot Plan Layout Requirement
8. Operation

|                                                                                   |                                                       |                                                  |
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[Table 3 -](#) Contents of a Process Design Basis (Onsite)

1. Scope
2. Process Definition
  - 2.1. Configurations
  - 2.2. Operating Cases
3. Unit Capacities
4. Feedstock Properties
5. Product Specifications
6. Battery Limit Conditions
7. Design Considerations
  - 7.1. General
  - 7.2. Operating Considerations
  - 7.3. Mechanical Considerations
  - 7.4. Instrument Considerations
  - 7.5. Future Considerations
8. Supplementary Design Data
  - 8.1. Utility Data

|                                                                                   |                                                                                |                                                  |
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[Table 4 -](#) Contents of a Facility Design Basis (Offsite)

1. Scope
2. Facility Definition
  - 2.1. Configurations
  - 2.2. Operating Cases
3. Capacity (or Basis of Capacity Determination)
4. Raw Material Properties
5. Specifications
6. Battery Limit Conditions
7. Design Considerations
  - 7.1. General
  - 7.2. Operating Considerations
  - 7.3. Mechanical Considerations
  - 7.4. Instrument Considerations
  - 7.5. Civil Engineering Considerations
  - 7.6. Future Considerations
8. 8. Supplementary Design Data
  - 8.1. Topological Data
  - 8.2. Meteorological Data
  - 8.3. Utility Data

## 7. REVISION HISTORY

| REV NO.           | DATE                       | SCOPE                     | DESCRIPTION                                                                                                                                                                                      |
|-------------------|----------------------------|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0                 | 1998.04.17                 | All Pages                 | -Team: Process Engineering<br>-Prepared by: J.H.Park, J.E.Lim<br>-Checked by: B.I.Lee, S.B.Cho, J.C.Noh<br>-Approved by: S.K.Oh                                                                  |
| 1                 | 2003.07.16                 | All Pages                 | Partial Revision<br>-Team: Process Engineering<br>-Prepared by: J.M.Lee<br>-Checked by: E.D.Lee, J.H.Park, J.C.Noh<br>-Approved by: C.S.Jung                                                     |
| 2                 | 2010.11.20                 | All Pages                 | Document Numbering Revision<br>-Team: Process Engineering<br>-Prepared by: I.Hwang<br>-Checked by: Henry Sung, J.C.Noh,<br>H.H. Kwak, M.H.Oh, S.E.Hong<br>-Approved by: E.D.Lee                  |
| <a href="#">3</a> | <a href="#">2013.07.09</a> | <a href="#">All Pages</a> | <a href="#">-Team: Process Engineering Department</a><br><a href="#">-Prepared by: I. H. Hwang</a><br><a href="#">-Checked by: P.M. Hur, J.H. Park,</a><br><a href="#">-Approved by: S.B.Lee</a> |