

SPD0039ERN
PROCESS DESIGN MANUAL
OPERATION MANUAL

REV. : 2

DATE: 2013.07.09



SAMSUNG
ENGINEERING

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1. SCOPE

This manual covers the format, basic considerations in preparing operation manuals, necessary contents and noteworthy points for each chapter, etc. The purpose of this manual is to standardize the quality of operation manuals which must be prepared by the Contractor.

Although operation manuals differ to some extent from process to process, the designers shall conform to the philosophy and standardization concepts of this manual as much as possible.

2. FORMAT

2.1. General

In principle, a separate operation manual shall be prepared for each process unit. However, in the case of thin volumes, operation manuals for two or more process units can be integrated into one book.

On the other hand, operation manuals for utility facilities and auxiliary facilities shall be presented in the form of combined books because of their small volume.

2.2. Covers and Size

The format of operation manuals shall essentially conform to the SECL Standard Proposal format.

The following format shall be used for operation manuals, with minor variations from the above-mentioned standard.

(1) Size of covers: 225 mm Width x 300 mm Length

(bound on 300 mm side)

(2) Size and type of back covers:

Size - Free thickness, up to 80 mm max.

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Type - Integral type with covers

(3) Color of front and back covers:

Operation manuals for process units - Dark blue without window

Operation manuals for utility and auxiliary facilities - Light blue without window

(4) Color of title on front and back covers : White

(5) Form of title character: Helvetica light

(6) Printing of character : Leaf stamping

2.3. Titles

The operation manual shall be named: OPERATION MANUAL.

The titles shall include:

(1) Plant or unit name and number

(2) Project designation

(3) Company name

(4) Refinery/Factory name or location

(5) Contractors name and logo

A typical arrangement of titles is illustrated in Fig. 2-1.

3. BASIC CONSIDERATIONS IN PREPARING OPERATION MANUALS

3.1. Processes

The [designers](#) should keep the following in mind when preparing operation manuals.

(1) Purpose of operation manual

From the Contractor's standpoint, the purpose of an operation manual is not

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only to help the operation engineers on the customer side, but also to protect the Contractor from any liability which may arise as a result of any trouble or damage the plant sustains due to malfunction.

It is impossible to design a perfectly safe plant. Accordingly, the design philosophy mentioned in [Design Philosophy \(SPD0005ERN\)](#) should be reflected in the operation manual. Also, minor defects may be found during the design stage and should be covered by the pertinent operation manual, or preferably by modification of design.

In this context, it should be emphasized that the preparation of an operation manual is the final item of basic design work.

(2) Extent of description

To what extent should an operation manual describe a plant in detail?

In principle, the operation manual furnished by the Contractor is one of the typical examples of operation procedures and a guideline for familiarizing operators on the customer side with the plant.

The detailed operation procedure, including the sequence of valve operations, time schedules, etc., should be prepared by the operation engineers on the customer side, taking into consideration the organization, staffing, emergency communication channels, etc.

Alternatively, in the event that the operation supervisor is dispatched by the process licensor or the Contractor, he is responsible for the preparation of the time schedule.

(3) Protection of the Contractor from liability in the event of malfunction

The [designer](#) should carefully study the history of troubles experienced and countermeasures employed in similar processes to date. Abnormal levels of operating variables (temperature, pressure, flow rate, level of fluid in vessel, etc.) together with appropriate countermeasures should be listed in the operation manual to avoid similar troubles.

Although it is not necessary to go into detail, it is important to mention the

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possibility of abnormal operating conditions. This will serve to protect the Contractor from liability in the event of trouble.

(4) Final check of basic design

Along with the preparation of the operation manual, the basic design should be checked carefully at this stage. The operation philosophy (or operation notes), which was prepared in the early stages of the basic design should be reviewed. Make sure that the necessary facilities, equipment, instruments and lines, etc., for each operating mode (namely start up, normal operation, shut down, emergency, regeneration, maintenance, etc.) are taken into consideration.

3.2. Licensed Processes

In principle, operation manuals for licensed processes should be furnished by the process licensor.

4. CONTENTS OF THE OPERATION MANUAL

In order to standardize the quality of the operation manual, the items (chapters) which shall be included in the operation manual are listed in Table 4-1. Needless to say, some of these items may be modified or deleted depending upon the particular process.

5. NOTEWORTHY POINTS

(1) General

Generally, the necessary documents providing a guide to operation are the following:

Operation manual

Analytical manual

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Vendors' instruction manuals

Vendors' instruction manuals have priority over the operation manual prepared by the Contractor in order to place the responsibility for malfunction on the vendors.

It is recommended that the following figures and tables be inserted in the operation manual for the operators' convenience and easy comprehension.

Figures

Trip sequence (flow) diagram

Simplified flow scheme of plant heat-up

Simplified flow scheme of catalyst reduction, activation, oxidation and regeneration

Simplified flow scheme of feed cut-in, shut-down and other operation modes

Furnace drying curve

Other charts

Tables

Safety relief valve list

Setting point list for instruments (Especially alarm and trip elements)

Analytical schedule

(2) Chapter 1 – 3 [\(Introduction/Proc Description/Theory & Principals of Process\)](#)

No need for particular mention.

(3) Chapter 4 [\(Plant Control Systems & Operating Variables\)](#)

This chapter embodies the main process features and is designed to help the plant operators overcome troubles not mentioned in Chapter 5 - 10.

The basic designer should pay much attention to this chapter and describe the effect of operating variables and troubleshooting procedures in as much detail as possible.

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(4) Chapter 5 ([Initial Start-up Preparation](#))

Since some work during this period is carried out in parallel with the construction work, it must be started at an appropriate time after confirming the progress status of the construction work.

(5) Chapter 6 – 8 ([Initial Start-up/ Normal Start-up/ Normal Shutdown Procedure](#))

There are several start-up and shut-down procedures and the procedure written in the operation manual is a typical example.

Several operating activities shall be conducted at the same time during this period, so it is difficult to describe the order in a time schedule. This fact should be clarified and mentioned in the operation manual.

Make sure that there are no discrepancies between the operation manual and the vendor's instruction manuals.

Make sure that there is no discrepancy in the Contractor's design.

Confirm with the vendor whether alternate operation of equipment, especially rotary machines, is possible. Generally, an LPG (or naphtha) pump cannot be used to pump water for example.

(6) Chapter 9 ([Emergency Shutdown Procedure](#))

a) Since all types of emergencies cannot be discussed, examples of some typical emergencies are taken up. Generally, a double-failure or multiple failure scenario cannot be discussed because of its complexity, though it often occurs in actual emergencies.

b) Since measures to be taken in an emergency vary according to the type, degree and duration of the emergency encountered, the chief operation engineer (or operation supervisor dispatched by the Contractor) is responsible for determining measures to be taken. This should be emphasized in the operation manual.

(7) Chapter 10 ([Miscellaneous Procedures](#))

The various paragraphs in this chapter may, alternatively, be included in the

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other chapters.

(8) Chapter 11 ([Safety Instructions](#))

Safety instructions issued by the competent local authorities shall take precedence over this chapter.

(9) Chapter 12 ([Analytical Plan](#))

The analytical plan comprises sample name, sampling point, analytical items, analytical methods and sampling frequency.

Needless to say, the sampling frequency will vary depending upon whether the operation is start-up, normal or shut-down.

Detailed analytical procedures are prepared separately in the form of an Analytical Manual.

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6. REVISION HISTORY

REV NO.	DATE	SCOPE	DESCRIPTION
0	98.04.17	All pages	-Team: Process Engineering -Prepared by: E.D.Lee, S.B.Lee -Checked by: B.I. Lee, S.B. Cho, J.C. Noh -Approved by: S.K.Oh
1	2010.11.25		- Document number change due to new numbering system - Written at Process Eng'g Dept.II Written by : C.H.Yun Checked by : J.H.Park Approved by : Y.Y.Koo
<u>2</u>	<u>2013.07.09</u>	<u>All pages</u>	- <u>Minor change of description</u> - - <u>Written at Process Eng'g Dept.</u> <u>Written by : I.Hwang</u> <u>Checked by : M.H. Oh, P.M. Hur</u> <u>Approved by : S.B.Lee</u>

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1.1 General

1.2 Basis of Design

1.2.1 Plant Capacity

1.2.2 Raw Material

1.2.3 Product (and By-product) Specifications

1.2.4 Utility Conditions

CHAPTER 2. PROCESS DESCRIPTION

2.1 General

2.2 A Section

2.3 B Section

2.4 C Section

CHAPTER 3. THEORY AND PRINCIPLES OF PROCESS

3.1 A Section

3.2 B Section

3.3 C Section

CHAPTER 4. PLANT CONTROL SYSTEMS AND OPERATING VARIABLES

4.1 Plant Control Systems

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4.1.1 A Section

4.1.2 B Section

4.1.3 C Section

4.2 Effect of Operating Variables

4.2.1 A Section

4.2.2 B Section

4.2.3 C Section

4.3 Troubleshooting Guide

4.3.1 A Section

4.3.2 B Section

4.3.3 C Section

CHAPTER 5. INITIAL START-UP PREPARATION

5.1 Plant Inspection After Completion of Mechanical Side

5.1.1 Field Checking

5.1.2 Commissioning of Utilities

5.1.3 Mechanical Running Test of Rotary Machinery

5.2 Cleaning and Washing of Piping System

5.3 Furnace Drying

5.4 System Drying

5.5 Chemical Cleaning and Preparation of Chemicals

5.6 Catalyst Loading

5.7 Leakage Test

5.8 Purging Air with Nitrogen

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6.2 Heating Up of Plant

6.3 Reduction and Activation of Catalyst

6.3.1 A Catalyst

6.3.2 B Catalyst

6.3.3 C Catalyst

6.4 Feed Cut-in

6.5 Putting into Normal Operation

6.5.1 Adjustment of Operating variables

6.5.2 Product Rundown

6.5.3 Load up

6.5.4 Setting of Control and Alarm Systems

CHAPTER 7. NORMAL START-UP PROCEDURE

7.1 General

7.2 Re-startup after Short Duration (Hot Start)

7.3 Re-startup after Long Duration (Cold Start)

CHAPTER 8. NORMAL SHUT-DOWN PROCEDURE

8.1 General

8.2 Load Down

8.3 Shut-down of A Section

8.4 Shut-down of B Section

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9.2 Safeguarding Systems and Equipment

9.2.1 Trip Sequence System

9.2.2 Safety Relief Valve

9.3 Causes of Emergency Shut-down

9.3.1 Actuation of Trip Sequence System

9.3.2 Feed or Utility Failure

9.3.3 Other Accidents

9.4 Measures to be Taken for Each Type of

9.4.1 Feed Failure

9.4.2 Power Failure

9.4.3 Steam Failure

9.4.4 Cooling Water Failure

9.4.5 Instrument Air Failure

9.4.6 Plant Air Failure

9.4.7 Fuel Gas (Fuel Oil) Failure

9.4.8 Boiler Feed Water Failure

9.4.9 Machine (Mechanical) Failure

9.4.10 Upsets on Other Units

9.4.11 Other Faults and Failures

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CHAPTER 10. MISCELLANEOUS PROCEDURES

- 10.1 Catalyst Oxidation
- 10.2 Catalyst Regeneration
- 10.3 Catalyst Unloading
- 10.4 Decoking
- 10.5 Neutralization

CHAPTER 11. SAFETY INSTRUCTIONS

- 11.1 Flammable Gas/Air Mixture
- 11.2 Respiratory Protection
 - 11.2.1 Toxic Gas
 - 11.2.2 Oxygen Shortage
- 11.3 Chemicals

CHAPTER 12. ANALYTICAL PLAN

ATTACHMENTS: 1. Equipment List

- 2. Material Balance Sheet
- 3. Process Flow Diagram (Including Operating Conditions)
- 4. Piping and Instrument Diagram

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Fig. 2-1. Typical Arrangement of Title

