

TECHNICAL QUALITY CONTROL**JGS 210-120-1-09E**

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CONTENTS

	<u>PAGE</u>
1. SCOPE	2
2. WORK STEPS	2
3. GENERAL	2
3.1 Technical Quality Control	2
3.2 Technical Quality in Basic Design	2
3.3 Safety	2
3.3.1 Initial Stage of Basic Design	2
3.3.2 Latter Stage of Basic Design	3
3.4 Process Performance	3
3.4.1 Initial Stage of Basic Design	3
3.4.2 Latter Stage of Basic Design	3
3.5 Design Specification	3
3.5.1 Initial Stage of Basic Design	3
3.5.2 Latter Stage of Basic Design	3
3.6 Economical Design	3
3.6.1 Initial Design Stage	3
3.6.2 Process Design Stage	3
3.6.3 Basic Design Stage	4
APPENDIX. CHECK LIST FOR BASIC DESIGN OUTPUT	4
A. CHECK LIST FOR PROCESS FLOW DIAGRAM	4
B. CHECK LIST FOR PIPING AND INSTRUMENT DIAGRAM (P & ID)	4
B.1 Columns, Vessels and Tanks	4
B.2 Heat Exchangers	5
B.3 Fired Heater	5
B.4 Pumps	5
B.5 Compressors	6
B.6 Piping	6
B.7 Instrumentation	7
B.8 Special Equipment	7
B.9 Utilities and Non-process Lines	7
C. CHECK LIST OF PROCESS DATA SHEET	7
C.1 Common (Column/Reactor/Vessel)	7
C.2 Vessel, Column and Reactor	8
C.3 Column & Reactor	8
D. CHECK LIST OF PROCESS DATA SHEET	8
D.1 Common (H/E/Air Cooler/Fired Heater)	8
D.2 H/E., Air Cooler and Fired Heater	8
E. CHECK LIST OF PROCESS DATA SHEET	9
E.1 Common (Compressor/Pump)	9
F. CHECK LIST OF HYDRAULIC	9
G. CHECK LIST OF PROCESS DATA IN INSTRUMENT DATA SHEETS	9

1. SCOPE

This practice covers the control of the technical quality in the basic design.

2. WORK STEPS

The Basic design shall be confirmed through reviewing the following items.

3. GENERAL

3.1 Technical Quality Control

(1) The technical quality control in the basic design means to ensure that every activity performed at the basic design stage technically satisfies the job requirement.

3.2 Technical Quality in Basic Design

(1) The basic design quality is divided into the following four aspects.

- (a) Safety
 - (b) Process performance
 - (c) Design specification
 - (d) Economical design
- (2) The quality control activities defined in the Design Verification, para 5 of the "Front End Engineering Design Procedure" (JGS 220-130-1-01E), are to be performed ensuring that all the above items satisfy the requirement.
- (3) The details of each item are listed hereunder.
- (a) Safety :
Safety includes measures to prevent explosion, fire, adverse effects to worker's health, and environmental pollution.
 - (b) Process performance :
Matters specified in the guarantee contract
 - (i) Capacity
 - (ii) Yield or feedstock consumption
 - (iii) Product specifications
 - (iv) Utility consumption, etc.
 - (c) Design specification :
 - (i) Contents of the agreement with the client prior to design activities, such as applicable laws, regulations, codes, and standards, life of plant, operability, etc.
 - (ii) In addition, quality of design outputs necessary to proceed with the detailed design smoothly.
 - (d) Economical design :
 - (i) Optimum design in view of construction and operation costs
 - (ii) Prevention of over-design (excess quality)
 - (iii) In addition, pursuit of efficient engineering

3.3 Safety

3.3.1 Initial Stage of Basic Design

- (1) Is the nature of the plant considered 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. considered ?
- (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 considered ?

3.3.2 Latter Stage of Basic Design

- (1) Is Power failure considered in the policy of standby and the driver selection philosophy for rotary machines ?
- (2) Are the effluent summary and environmental data described?
- (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 design margin in consideration of normal/emergency operation ? Refer to JGS 210-120-1-012E "DESIGN PHILOSOPHY OF BASIC DESIGN".

3.4 Process Performance**3.4.1 Initial Stage of Basic Design**

- (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 ?

3.4.2 Latter Stage of Basic Design

- (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 considered 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 ?

3.5 Design Specification**3.5.1 Initial Stage of Basic Design**

- (1) Are the scope of specially applicable codes and client's standards specified ? Are the contents of these codes and standards fully clarified ?
- (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 ?

3.5.2 Latter Stage of Basic Design

- (1) Have the results of analyzing the past troubles been applied to the design ?
- (2) Is smooth start-up/normal/shutdown operation ensured ?
- (3) Is instrumentation system capable of accommodating every operation case ?

3.5.3 In case the design key person considers the necessity of check activity based on lists, it is recommended to use the "Check List for Basic Design Output" (Attachment).

3.6 Economical Design**3.6.1 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 ?

3.6.2 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 differential design of heat exchangers and the pursuit of the interchangeability considered?