

**BASIC ENGINEERING
DESIGN DATA****JGS 210-120-1-04E**

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1. SCOPE

- (1) This practice covers the requirements for preparation of Basic Engineering Design Data (BEDD) for petroleum refineries, petrochemical and similar plants.
- (2) BEDD shall be confirmed in writing before starting the design work.
- (3) The BEDD is a summary of basic points to be followed in the basic and detailed design.
- (4) The process design basis shall specify any conditions of individual process unit, but BEDD shall be standardized for application to all process units in the same plant site since common requirements at the site shall be applied to the design.

2. FORMAT**2.1 Blank Form**

The following items shall be filled in by reviewing and deciding each item individually prior to starting the design work.

The blank form is attached to aid in preparing BEDD, but the floppy disks stored at the Standard Administration Group in the Engineering Technology Department should be used to prepare BEDD.

2.2 Contents

The contents of BEDD are classified as follows :

- (1) General matters : Units of measurement, applicable laws and regulations and standards.
 - (2) Utility conditions : Conditions of any utilities to be used in the plants, for steam, electric power, water, fuel, air and inert gas, etc..
 - (3) Flare and liquid blow - down conditions : Depressing of flare under emergency conditions including requirements for waste oil disposal.
 - (4) Site conditions : Climatic conditions and soil conditions.
 - (5) Environmental preservation : Limitations on the emission of noise, waste water, waste liquid and waste gas.
 - (6) Plant layout : Safety distances, limitations of erection work and the equipment transportation to the plant site, Construction and Geographic North.
 - (7) Basis for equipment : Basic requirements for the standardization of equipment in the entire plant.
 - (8) Basis for instrumentation : Basic requirements for the standardization of control systems and instrumentation in the entire plant.
 - (9) Basis for Building
 - (10) Other matters : Owner's requirements or licensor's standard practices shall also be considered in design.
- *: Numbering system that is the basic configuration for indication of equipment, lines and instrumentation, etc is not included in BEDD.

3. WORK PROCEDURE**3.1 Input to the Design****3.1.1 Timing**

- (1) Generally, all items to be specified in BEDD shall be decided before starting engineering work. If some items could not be decided at such a stage, they should be settled according to the progress of the engineering work.
- (2) Since some detailed requirements of the detailed design cannot be covered by BEDD, Detailed Engineering Design Data (abbreviated as DEDD) are prepared in some cases for unification of equipment detailed design.

3.1.2 Procedure

BEDD will be prepared by the plant engineer with the cooperation of other engineers, however, many items of BEDD shall be decided from the standpoints of overall plant safety, client's requirements or licensor's standards & practice. Also maintenance and future plans shall also be considered.

3.1.3 Input Data**(1) General**

Many standards for design engineering are established by public organizations and companies. The applicable standards shall be decided before the project is started.

(a) Standards for design :

Standards are used to maintain the level of performance in plant design. Owner's and Contractor's standards fall under this category. Laws and codes are intended chiefly to indicate constructional requirements from the safety standpoint while many company standards are established to keep the plant performance above a certain level. Some company's standards cover the criteria for safety levels. In such a case, these criteria can be adopted as design basis. If the criteria conflict with the associated laws and regulations, the priority order as to the application of the criteria, laws and regulations should be established between clients.

(b) Laws, codes and regulations:

Various laws, codes and regulations are enforced by the national or local governments to secure the public safety of plant and its surroundings including prevention of the environmental pollution (air water noise, etc.). In the design of plants, the legal requirements shall be satisfied.

(c) Public standards :**(2) Utility conditions**

(a) To proceed with the design work of process units, it is necessary to equalize the utility conditions as the design basis for each process unit.

(b) The utility conditions shall be decided based on the requirements on the process unit side. Furthermore, to finalize such conditions, the approximate consumption, weather conditions, plot plan, waste heat recovery methods, local conditions, etc. shall also be considered.

(c) Generally as many factors remain uncertain when the utility conditions shall be decided, the economic studies may not be conducted precisely at that stage. Hence, when the basic plan is marked out, the utility conditions are preliminarily determined by studying the economy. Subsequently, the utility conditions shall be finalized to maximize the efficiency of each unit.

(d) Sufficient studies are required especially to decide the conditions of steam, cooling water and electric power.

(e) As many utility consumption (especially steam) will be fluctuated depending on the various factors, such as the changes in the operating conditions, ambient conditions, etc. At least the following conditions shall be specified in BEDD :

- Normal Case
- Maximum Case
- Minimum Case
- Mechanical Design Conditions

(f) The voltage of power for electric motors, the applications of steam turbines and philosophy of stand-by equipment of rotary machinery shall specified in BEDD. These are closely related with the utility supply in the entire plant, and intermediate tanks are provided between the process units if necessary.

(3) Flare and liquid blow-down conditions

The flare and blow - down systems are intended to dispose of gas and liquid discharged in an emergencies. These systems shall be planned for the entire plant basis.

(4) Site conditions

Climatic conditions such as the wind direction, wind velocities, ambient temperature, rainfall and snowfall intensity, other natural conditions such as sea water levels and velocity, river water level and velocity, underground water levels, and site conditions such as types of land, soil conditions and ground levels are shown in BEDD.

(5) Measures against environmental pollution

Noise, waste water, waste liquid and waste gas are major sources of environmental pollution for public nuisances. The legal restrictions are imposed on their emissions. In some cases, construction works, equipment construction, disposal systems and equipment layouts are limited by laws or regulations.

(6) Plant layout

Considerations of the plot plans for the entire plants and individual process units as well as limitations owing to safety distances are basic matters for the preparation of the plot plan and equipment layout. Besides these, the designs and erection procedures may be influenced by conditions involved in the haulage of large equipment to their locations.

(7) Basic requirements for equipment

- (a) For columns if specific types of trays, packing in use or materials are desired or required, they shall be indicated on BEDD accordingly.
- (b) Where the use of air cooled heat exchangers are desired, the scope of their applications shall be entered in BEDD. The fouling factors of the heat exchangers should be shown with consideration given to the properties of applied fluid. Size of air cooled heat exchanger tubes are standardized to facilitate their replacement with spares. Dimensions and weight limitations of tube bundles are usually decided based on the capacity of construction equipment for maintenance.
- (c) Other requirement for the basic design if any, shall be specified in BEDD.

(8) Basic requirements for instrumentation

- (a) If the philosophy of the instrumentation and the control systems are not standardized, many inconveniences will be encountered in operation, administration and maintenance.
- (b) The basic requirements for instrumentation shall be fully reviewed and decided so as to meet the requirement of plants to be expanded in the future.

(9) Others

- (a) Conditions requested by the owner for buildings, platforms, steel structures, firefighting facilities, pavement, painting, insulation, etc. should be shown in detail.
- (b) Plant operating companies have different thoughts on the plant composition. This difference is large and varies, depending on industries such as the petroleum refining, petrochemical, coal chemical, general chemical and inorganic chemical industries.

4. RELATED DOCUMENTS

The following publications will constitute a part of this standard practice. Unless otherwise specified, refer to the latest edition. Applicable publications for the Project will be specified in each of the Project Specifications.

JGS (JGC Standard Practice)

JGS 210-049-1-01E Handling of Basic Design Manual

PROJECT SPECIFICATION

Job No.	Doc. No.	Rev.
Date :		Sheet of
Prp'd :		
Chk'd :		
App'd :		

ATTACHMENT

BASIC ENGINEERING DESIGN DATA

Rev	Date	Page	Description	Prpd	Chkd	Appd

BASIC ENGINEERING DESIGN DATA

CLIENT

PLANT LOCATION

PROJECT

This specification indicates the conditions relating to the basic design for the above project.

This specification shall be used together with

- **Process Design Practice & Information**
- **Design criteria for P & ID**
- **Design Criteria for Plant Layout**
- **Numbering Procedure**

The detailed design shall be in accordance with the DETAILED ENGINEERING DESIGN DATA.

Item	Page	Description
General		
Utility		
Flare & Liquid Blowdown		
Site Condition		
Environmental Preservation		
Plant Layout		
Bases of Equipment		
Instrumentation		
Building		
Others		

Notes:

1. Square blocks hereinafter to be marked as follows:

☐ : Yes

☐ : Substantially Yes

☐ : Substantially No

[illegible]

REV.	DATE	PAGE	DESCRIPTION	PREP'D	CHK'D	APP'D
X						
X						
X						
X						
X						
X						
X						

Documents

BASIC ENGINEERING DESIGN DATA

GENERAL (1)

1. Measurement System ☐ SI ☐ Metric System ☐ English System

For details, refer to Attachment-1

2. Standard for design basis to conform to _____

3. Plant is to be designed in accordance with the following laws and regulations.

- (1) Pressure Vessels _____
- (2) Boilers _____
- (3) Buildings and Structures _____
- (4) Electricals _____
- (5) Fire Fighting _____
- (6) Water Pollution _____
- (7) Air Pollution _____
- (8) Safety _____
- (9) Sanitation _____
- (10) Aircraft Warning _____
- (11) Noise _____
- (12) Storage Tanks _____

PROJECT SPECIFICATION

JOB No.

DOC No.

REV.

SHEET ____ OF ____

BASIC ENGINEERING DESIGN DATA

GENERAL (2)

4. Codes and Standards

- | | | | |
|--|--|---------------------------------------|--------------------------------|
| (1) Engineering Standard | ☐ Client's Standard | ☐ JGC Standard | ☐ _____ |
| | ☐ _____ | ☐ _____ | ☐ _____ |
| (2) National Standard | ☐ ANSI | ☐ JIS | ☐ _____ |
| | ☐ _____ | ☐ _____ | ☐ _____ |
| (3) Material Specifications | ☐ ASTM | ☐ JIS | ☐ _____ |
| | ☐ _____ | ☐ _____ | ☐ _____ |
| (4) Petroleum Industry Code | ☐ API | ☐ JPI | ☐ _____ |
| | ☐ _____ | ☐ _____ | ☐ _____ |
| (5) Pressure Vessel and
Boiler Code | ☐ ASME | ☐ JIS | ☐ _____ |
| | ☐ _____ | ☐ _____ | ☐ _____ |
| (6) Heat Exchanger Standard | ☐ TEMA | ☐ JIS | ☐ _____ |
| | ☐ _____ | ☐ _____ | ☐ _____ |
| (7) Electrical Code | ☐ NEMA | ☐ IEC | ☐ NEC |
| | ☐ JIS | ☐ JEC | ☐ JEM |
| | ☐ _____ | ☐ _____ | ☐ _____ |
| (8) Civil and Architectural Code | ☐ ACI | ☐ AISC | ☐ AASHO |
| | ☐ JIS | ☐ _____ | ☐ _____ |
| | ☐ _____ | ☐ _____ | ☐ _____ |

Detailed application of above codes and standards is specified in Detailed Engineering Design Data or General Specification of each category.

5. Remarks

BASIC ENGINEERING DESIGN DATA

UTILITY (STEAM-1)

1. Battery Limit Condition

Service	Pressure ()				Temperature ()				Supply Volume ()
	Nor.	Max.	Min.	Mecha. Design	Nor.	Max.	Min.	Mecha. Design	

2. In Process Area

Service	Pressure ()				Temperature ()				Remarks
	Nor.	Max.	Min.	Mecha. Design	Nor.	Max.	Min.	Mecha. Design	

3. At Boiler Plant

Service	Pressure ()				Temperature ()				Remarks
	Nor.	Max.	Min.	Mecha. Design	Nor.	Max.	Min.	Mecha. Design	

Above conditions only apply to the generated steam, regarding the design condition of boiler itself, refer to Basic Engineering Design Data of Boiler (S- - -).

Remarks: _____

Classification of Nor, Max. and Min. conditions.

1. _____
2. _____
3. _____

UTILITY (STEAM-2)

4. Condensate

(1) Condensate Recovery System

Service		Pressure ()		Temperature ()		
Condensate	Steam	Ope	Design	Ope	Design	

(2) Classification of Condensate

Steam	Process Equipment	Turbine	Header Drain	Trace Drain		

Note: In case the above-mentioned conditions are not applicable for the condensate of off-site facilities, the following conditions shall be applied.

General design conditions for off-site facilities shall be specified in S- ____ - ____ - ____.

PROJECT SPECIFICATION

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BASIC ENGINEERING DESIGN DATA

UTILITY (ELECTRIC POWER)

1. In process Area

(1) Voltage _____ V

(2) Phase _____

(3) Frequency _____ Hz

(4) Receiving _____ KVA

(5) Supply System _____

2. Distribution

(1) Voltage and phase

Steam	Horsepower Range	Voltage (V)	Phase	Remarks
Motors	KW and less			
	KW ~ KW			
	KW ~ KW			
	KW and over			
Lighting				
Instruments				

3. Emergency Power Source

Type of Power Source	UPS	DPS	Diesel Engine Generator
<u>Necessity</u>	☐ YES ☐ No	☐ YES ☐ No	☐ YES ☐ No
<u>Time of Back up</u>	☐ 10 min. ☐ 30 min.	☐ 10 min. ☐ 30 min.	☐ _____ hr*1 ☐ _____
<u>User of Power</u>	☐ _____ _____	☐ _____ _____	☐ _____ _____

*: Capacity of Fuel Oil Tank

4. Remarks:

UTILITY (WATER-1)

1. Cooling Water

(1) Battery Limit Condition

Item		Clean Water ☐ River Water ☐ Well Water ☐ City Water	Sea Water	Recycle Water	
Available Capacity ()					
Water Pressure at grade ()		Supply			
		Return			
Water Temp. ()	Summer	Supply			
		Return			
	Winter	Supply			
		Return			
Max. Temp. for Exchanger Design ()		Inlet			
		Outlet			
To be discharged to					
Service					
Water Analysis Data					
Recycle Water	Type of Treatment				
	Wet Bulb Temp. ()				

BASIC ENGINEERING DESIGN DATA

UTILITY (WATER-2)

(2) Design Conditions of Cooling Tower

- (a) Source of Water _____
- (b) Capacity _____ (m³/hr)
- (c) Temperature: Inlet _____ (°C)
 Outlet (Max.) _____ (°C)
 Outlet (Max.) _____ (°C)
 Wet bulbe _____ (°C)
- (d) Pressure: Outlet _____ ()
 Inlet _____ ()
 (at G.L.)
- (e) Condense Ratio : _____ max.
- (f) Analysis Data of Water Source

2. Treated Water

(1) Battery Limit Conditions

		Pure Water	Boiler Feed Water
Available Capacity ()			
Supply Pressure at Grade ()			
Water Temp. ()	Max.		
	Min.		
Water Pretreatment Type			
Service			
Mechanical Design Condition	Press. ()		
	Temp. ()		
Water Analysis Data			

PROJECT SPECIFICATION

BASIC ENGINEERING DESIGN DATA

JOB No.

DOC No.

REV.

SHEET ____ OF ____

UTILITY (WATER-3)

(2) Design Conditions of Water Treating Unit

- (a) Capacity : _____ ()
- (b) Water Source : ☐ Sea Water, ☐ Sea Water
☐ City Water, ☐ Well Water
- (c) Pressure : Inlet _____ ()
Outlet _____ ()
- (d) Temperature: Inlet _____ ()
Outlet _____ ()
- (e) Required Water Specification

3. Drinking Water

Available Capacity ()	
Supply Pressure at grade ()	
Supply Water Temperature ()	☐ Yes ☐ No Type _____
Water Pretreatment	☐ City Water ☐ Well Water ☐ _____
Water Analysis Data	
Water Analysis Data	
Design Condition	Press. ()
	Temp. ()
Remarks:	