

EXECUTION PROCEDURE OF P&I DIAGRAM

JGS 210-120-1-46E

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1. SCOPE

- (1) This standard practice covers the phase control of P&I Diagram (P&ID) preparation, revision and follow-up for petroleum refineries, petrochemical and chemical plant (including utility and offsite).

This standard practice covers the following two cases of P&ID:

- (a) JGC carries out the preparation of the P&ID from draft to the as-built P&ID:
 - (b) JGC reviews, develops and revises the P&ID prepared by the licensor, and prepares the as-built drawings finally.
- (2) This standard practice does not cover any of the forms, drawing standards, design criteria and specific process technology related items concerning the preparation of the P&ID.
- (3) In some cases it is difficult to apply this practice completely owing to the effect of the contract type peculiar to the project, or the engineering schedule. However, this practice shall be applied to the project as far as possible.

2. WORK PROCEDURE

- (1) Personnel concerned in preparatory work shall be designated prior to the commencement of P&ID preparation work and clarify the required basic items for the purpose of minimizing the revisions.
- (2) Project Engineering Manager shall establish the engineering schedule for the issuance of each step of P&ID (Issuance Step I to IV) taking into account the requirements of the contract, project scope and features peculiar to the project.
- The issuance schedule of each step of P&ID (Issuance Step I to IV) might be flexible (either shorter or longer), however the P&ID steps (Issuance Step I to IV) and items to be indicated in each step of P&ID shall be adhered to.
- (3) Utilization of Estimation Engineering result is indispensable for development of P&ID.
- (4) The P&ID is also to be reviewed by the related disciplines other than the discipline responsible for the basic design before issuing to the client.
- This review is defined as "Internal P&ID Review". Also Marked-up P&ID based "Internal P&ID Review Meeting" should be held as the occasion demands.
- (5) The responsibility for the preparation, revision and handling of the P&ID and relevant coordination shall in principle be transferred from the process engineer to the project engineer upon issuance of the "P&ID for Construction"
- (a) Up to issuance of the "P&ID for Construction" : Process engineer
 - (b) Upon issuance thereof : Project engineer
- (6) Intelligent Computer oriented P&ID System "IRENE" (JGC), "PDS" (INTERGRAPH) will be useful since they handle stream property data.

3. PHASES FOR P&ID PREPARATION

3.1 Purpose of Phase Control

- (1) To clarify downstream work and define the items to be indicated in each step of P&ID (Issuance Steps I to IV)
- (2) To minimize recycle work caused by missing and erroneous information
- (3) To minimize the number of NPIC, FS

3.2 Definition of Each Phase

The process of preparing the P&ID is divided into the following 7 phases from the commencement to the completion of the P&ID work.

- Phase-1 : Preparatory step for preparation of the P&ID
- Phase-2 : P&ID for engineering start (Issuance Step I)
- Phase-3 : P&ID for client's approval (Issuance Step II)
- Phase-4 : P&ID for piping layout (Issuance Step III)
- Phase-5 : P&ID for construction (Issuance Step IV)
- Phase-6 : P&ID revision according to NPIC

Phase-7 : P&ID as built

3.3 Execution of Each Phase

All Phases given herein are applicable to the case where JGC carries out, by itself, the preparation of the P&ID from that of the draft to that of the as-built P&ID. In the case where the licensor prepares the P&ID, Phase-1 and 2 may be skipped.

3.4 Phase-1 Preparatory Step for P&ID Preparation

3.4.1 Premise

- (1) The process engineer shall prepare the "Drawing Standard for P&ID Preparation", "Design Criteria for the preparation of the P&ID" in cooperation with the other disciplines concerned. Serving as standards for the preparation of the P&ID, the above-mentioned are important, and have factors to decide including the design philosophy of the client. Accordingly, in preparing the above-mentioned, it may be recommended to hold a review meeting with the client if required so as to obtain a uniform design philosophy between the client and JGC.

For detail, refer to "Drawing Standard for P&ID Preparation" (JGS 210-120-1-70E), "Design Criteria for P&ID Preparation" (JGS 210-120-1-71E).

- (2) BEDD issuance
- (3) PFD establishment
- (4) Process Design Primary Information confirmation with client
- (5) Design Base confirmation with client
- (6) Numbering system confirmation with client
- (7) Instrument Selection basis confirmation with client

3.4.2 Process Operation Diagram (POD) (Normally not prepared)

When a process key engineer decides that the POD is to be prepared considering the complexity of the plant, the preparation of the POD is to be commenced at a stage where the PFD has been nearly completed. The allowable period for revising the POD shall be up to official issuance of the "P&ID for engineering start", and revisions on the POD upon completion of the above-mentioned official issuance shall be made by directly revising the P&ID.

3.5 Phase-2 P&ID for Engineering Start (Issuance Step-I: P&ID Rev-0 Draft)

3.5.1 Purpose

Preliminary Issue for engineering start

3.5.2 Issue Schedule

1.5 ~ 2.5 Month

3.5.3 Subsequent Downstream Work

- (1) P&ID Internal Review Meeting
- (2) Preparation of Plot Plan Rev. 0
- (3) Major (large bore size) and critical piping layout study which may influence the Plot Plan.

3.5.4 Premise

- (a) Completion of Phase-1 premises
- (b) Equipment list (Item No. & Name) fixed
- (c) VE to be already executed if necessary
- (d) Prompt selection of critical equipment vendor.
- (e) Line class to be fixed
- (f) Previous Marked up P&ID, Off-The-Shelf P&ID available.
- (g) Participation of P&ID keyperson