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CHEMICAL ENGINEERING

17/ENG01/013

PROCESS INSTRUMENTATION ASSIGNMENT

Question 1

Process Flow Diagrams (PFDs) are a graphical way of describing a process, its constituent tasks, and their sequence. A PFD helps with the brainstorming and communication of the process design. The PFMEA process needs a complete list of tasks that comprise the process under analysis. The level of detail can be decided by the team. Including more detail takes time, but it reduces the probability of missing Failure Modes. Process flow diagram (PFD) illustrates the arrangement of the equipment and accessories required to carry out the specific process; the stream connections; stream flow rates and compositions; and the operating conditions. The PFD is a diagrammatic representation of the process, which is normally drawn in a stylized pictorial form using international standards symbols

It is a diagram commonly used in chemical and process engineering to indicate the general flow of plant processes and equipment.

The Process flow diagram is the first flow diagram developed during the design process. The

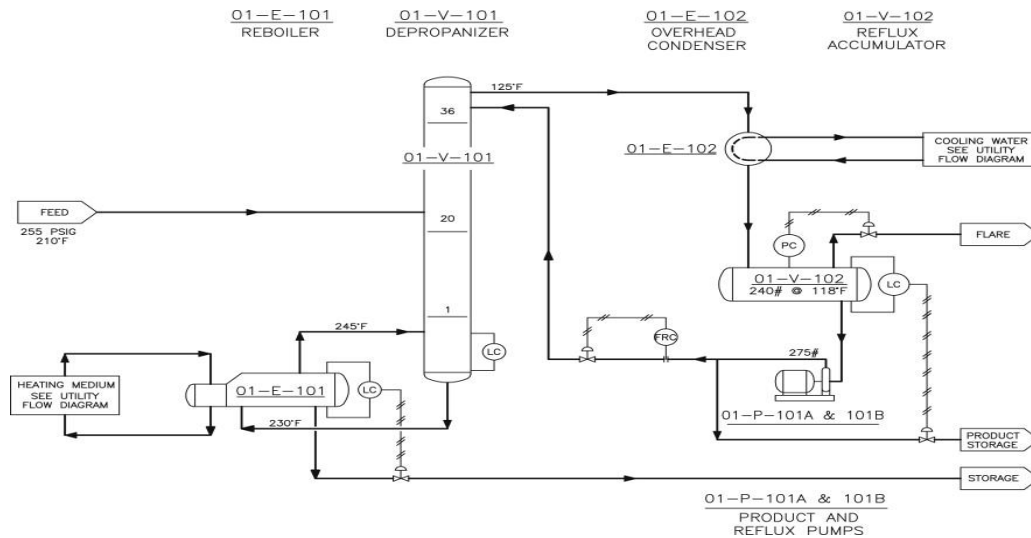
Process flow diagram will include the following:

- Major mechanical equipment
- Main piping
- Direction of commodity flow

- Operating pressures and temperatures of the facility components
- Major controlling instrumentation

The Process flow diagram will denote the following:

- Conditions to be used for the design of various pieces of mechanical equipment required for facility operation, that is, fractionation columns, pumps, heaters, etc.
- The operating and design conditions (pressures and temperatures) of which a particular piece of mechanical equipment will function. Design conditions establish the limits that certain components such as gaskets and valve seats used in the facility can withstand. Design pressure is calculated to be at least 10% above the maximum operating pressure or 25# greater (whichever is largest). The design temperature will be at least the maximum operating temperature, but should be at least 25 degrees above the normal operating temperature.
- Composition of the commodities used in the refining or treatment process sequence as they enter and leave the unit.
- Figure 7.1 is the Process flow diagram of Unit-01.



Question 2

A piping and instrumentation diagram (**P&ID**) is a detailed diagram in the process industry which shows the piping and process equipment together with the instrumentation and control devices.

A **P&ID** shows all piping, including the “physical sequence of branches, reducers, valves, equipment, instrumentation and control interlocks.” A **P&ID** is used to operate the process system, since it shows the piping of the process flow along with the installed equipment and instrumentation

Purpose. The **objective** of the **P&ID diagram** is to show the necessary information in order to understand the relationship between the conceptual design of the process, developed through the PFD and HMB **diagrams**, with reality. ... The **P&ID** provides the link between the conceptual and the actual.

Divisions

1. Process Unit P&ID's---- P&ID's of a particular unit such as a compressor, and inlet filter scrubber unit are called Process Unit P&ID's.
2. Utility P&ID's -----P&ID's of utilities such as instrument air and oil system, oily water and waste water, and tempered water are called Utility P&ID's.
3. Distribution P&ID's -----P&ID's of header distribution systems shown geographically are called Distribution P&ID's. It should be noted that the system need not necessarily be limited to utility distribution and can be used for process distribution.
4. Auxiliary P&ID's -----P&ID's of the equipment piping and instrumentation associated with an item of equipment are called Auxiliary P&ID's. A typical example would be the auxiliary equipment, piping and instrumentation necessary for a large compressor. The intent is to keep the Process Unit P&ID's as uncluttered as possible.
5. Packaged Unit P&ID's -----P&ID's provided by equipment suppliers for a packaged unit e.g. large centrifugal compressor unit etc. are called Packaged Unit P&ID's.
6. Symbols P&ID's----- P&ID's containing general notes, symbols, nomenclature and piping details are called Symbols P&ID's. KLM Technology Group Project Engineering Standard SP

Question 3

Symbols And Instrument Abbreviations



LI – Level Indicator ----→ Level Indication



FC – Flow Controller--→ Controlling flow

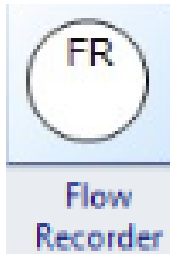


PSV – Pressure Safety Valve -→Relieving

excess pressure incase of high pressure situation



PI – Pressure Indicator→ Indicating Pressure



FR – Flow Recorder → Recording Flow

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