

Process Flowsheet (or Flow Diagram) Development

The flowsheet is the key document in process design. It shows the arrangement of the equipment selected to carry out the process; the stream connections; stream flow rates and compositions; and the operating conditions.

Types of PFD (process flow diagram)

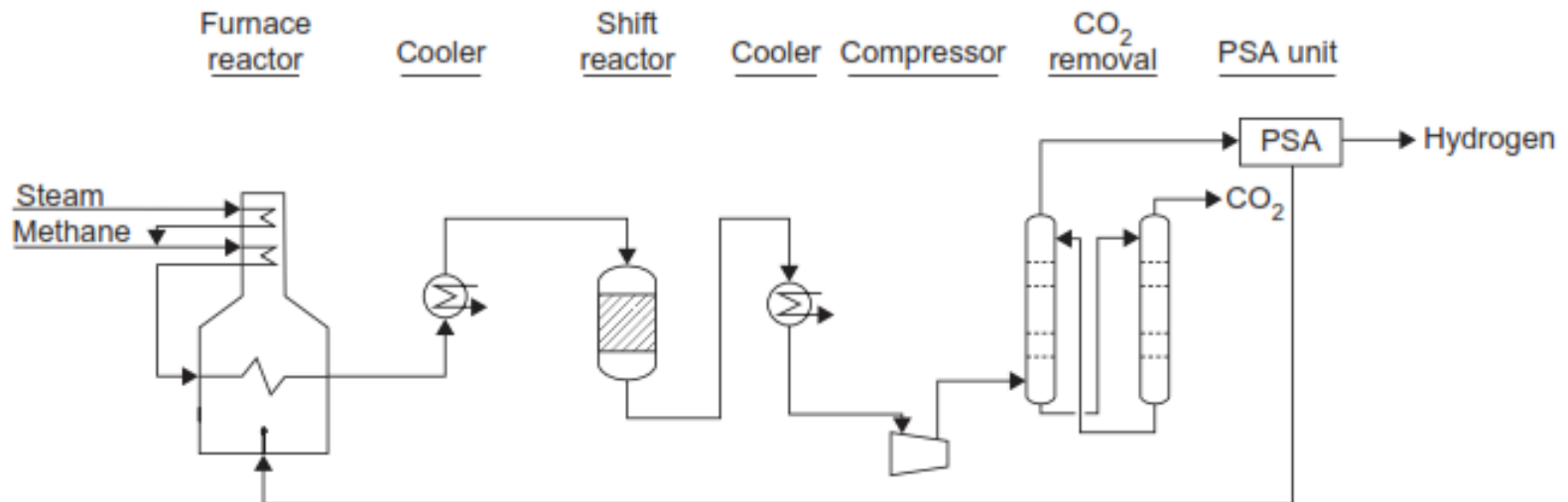
A simple block flow diagram (to give a rough idea of the overall process flow structure, and may be useful when giving a presentation.)

A full PFD (include all of the process vessels and equipment and show all the process and utility flow lines. A full heat and material balance of the process showing the composition, flow rate, and temperature of every stream is usually included in or with a PFD. The PFD also indicates the location of every control valve.)

Piping and instrumentation diagram (P&ID) (a more detailed version of the PFD that also includes information on ancillary instruments and valves, sampling and drain lines, start-up and shutdown systems, and pipe sizes and metallurgy. The P&ID is used in detailed design and safety analysis.)

Block Diagrams

- A block diagram is the simplest form of flow diagram. Each block can represent a single piece of equipment or a complete stage in the process. Block diagrams are useful for showing simple processes.
- Block diagrams are often drawn using simple graphics programs such as Microsoft Visio



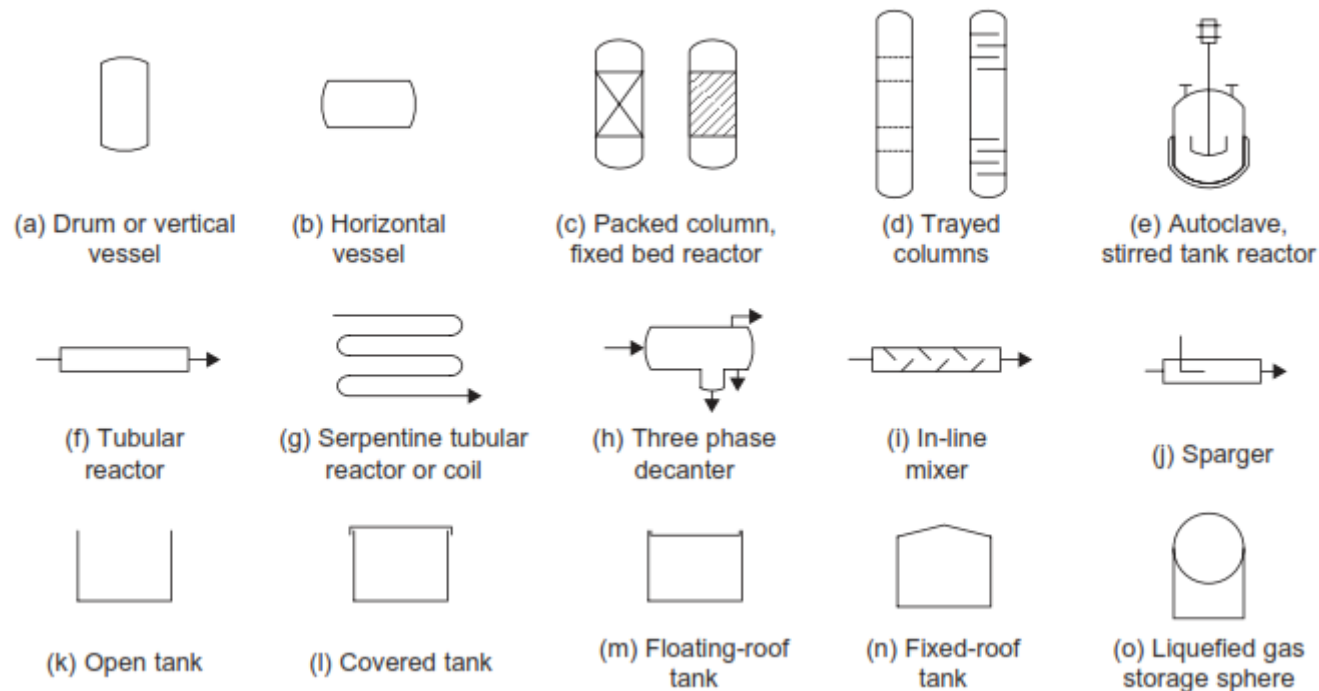
For complex processes, their use is limited to showing the overall process, broken down into its principal stages.

Block diagrams are useful for representing a process in a simplified form in reports, textbooks and presentations, but have limited use as engineering documents.

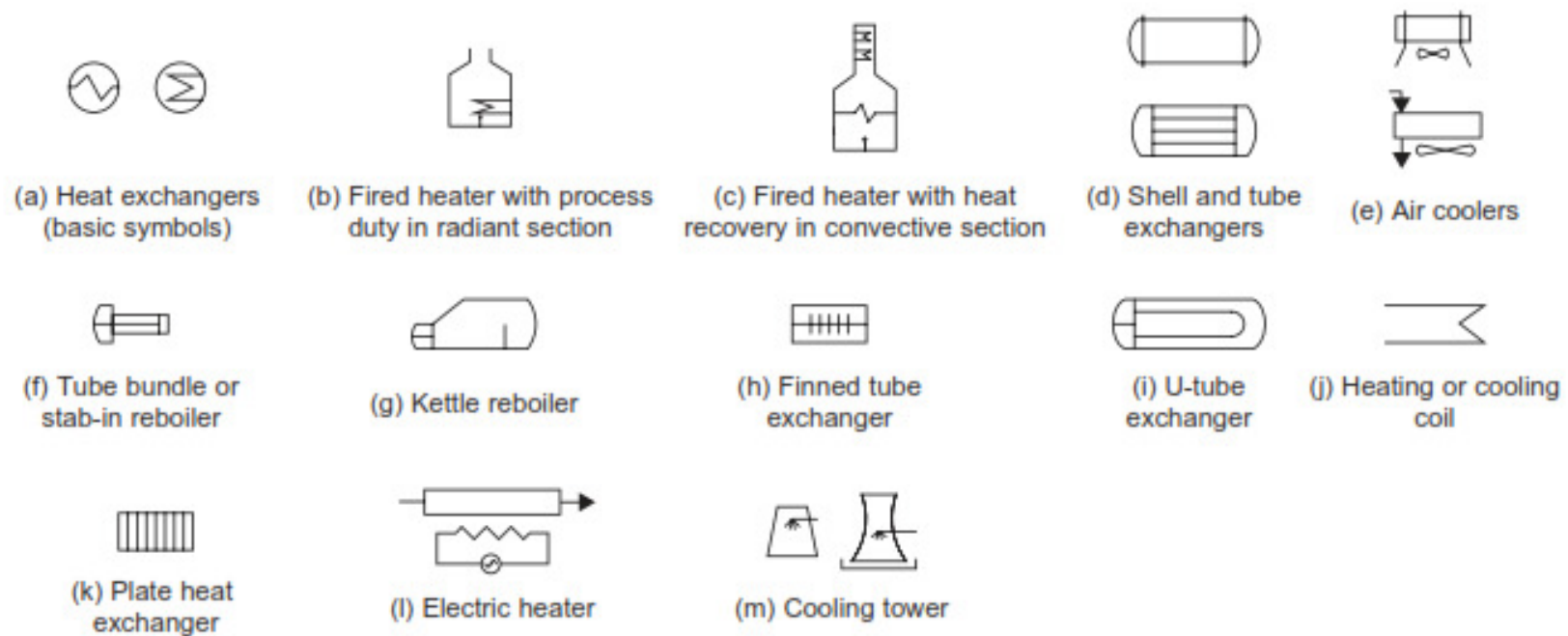
The stream flow rates and compositions can be shown on the diagram adjacent to the stream lines, when only a small amount of information is to be shown, or tabulated separately.

PFD Symbols

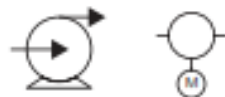
On the detailed flowsheets used for design and operation, the equipment is normally drawn in a stylized pictorial form.



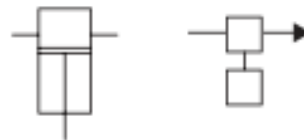
PFD symbols for reactors, vessels, mixers, and tanks.



PFD symbols for heat transfer equipment.



(a) Centrifugal pumps



(b) Reciprocating pumps or compressors



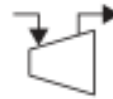
(c) Positive displacement pump or fan



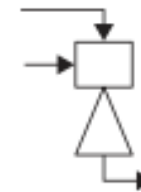
(d) Gear pump



(e) Axial or centrifugal compressor

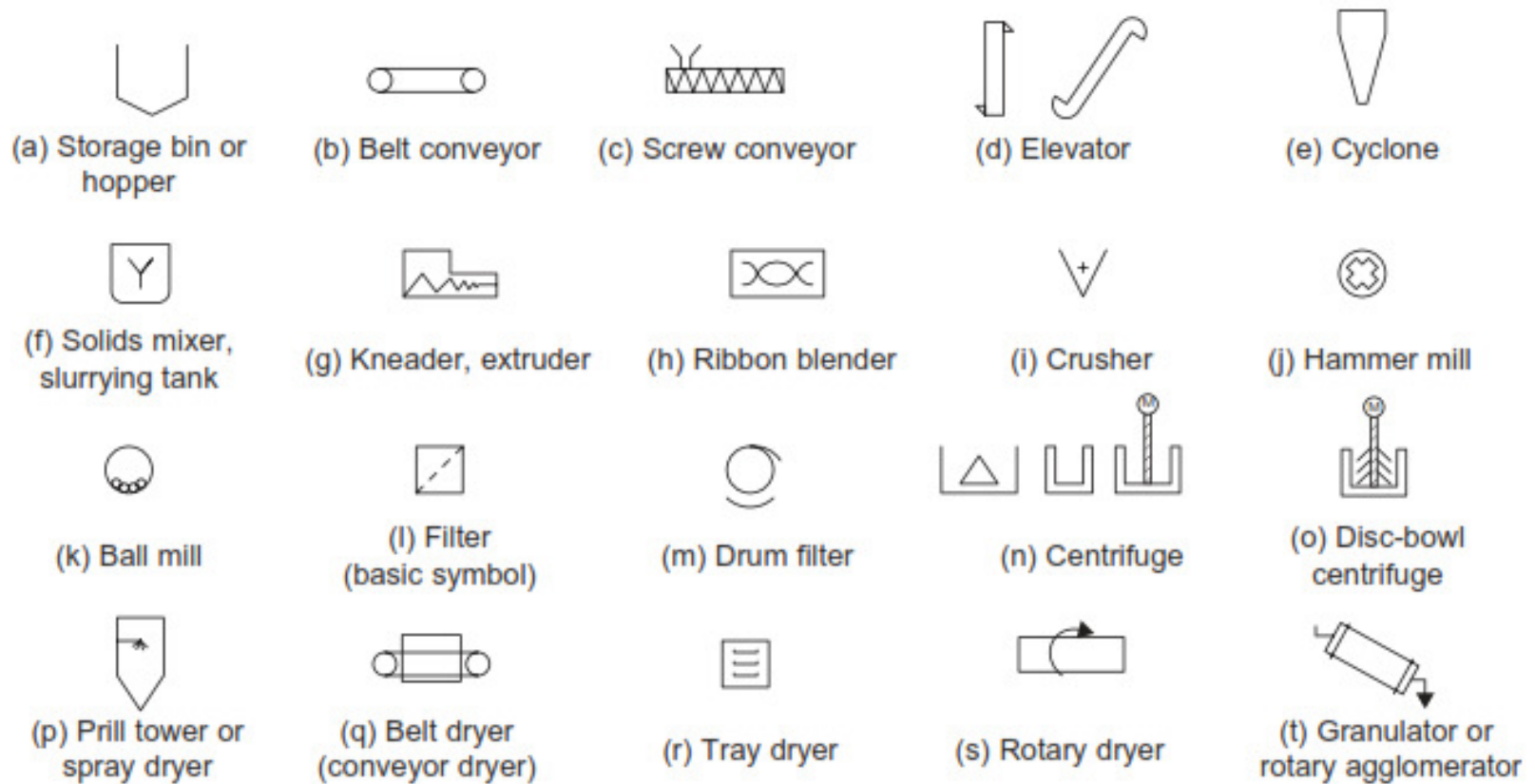


(f) Turbine

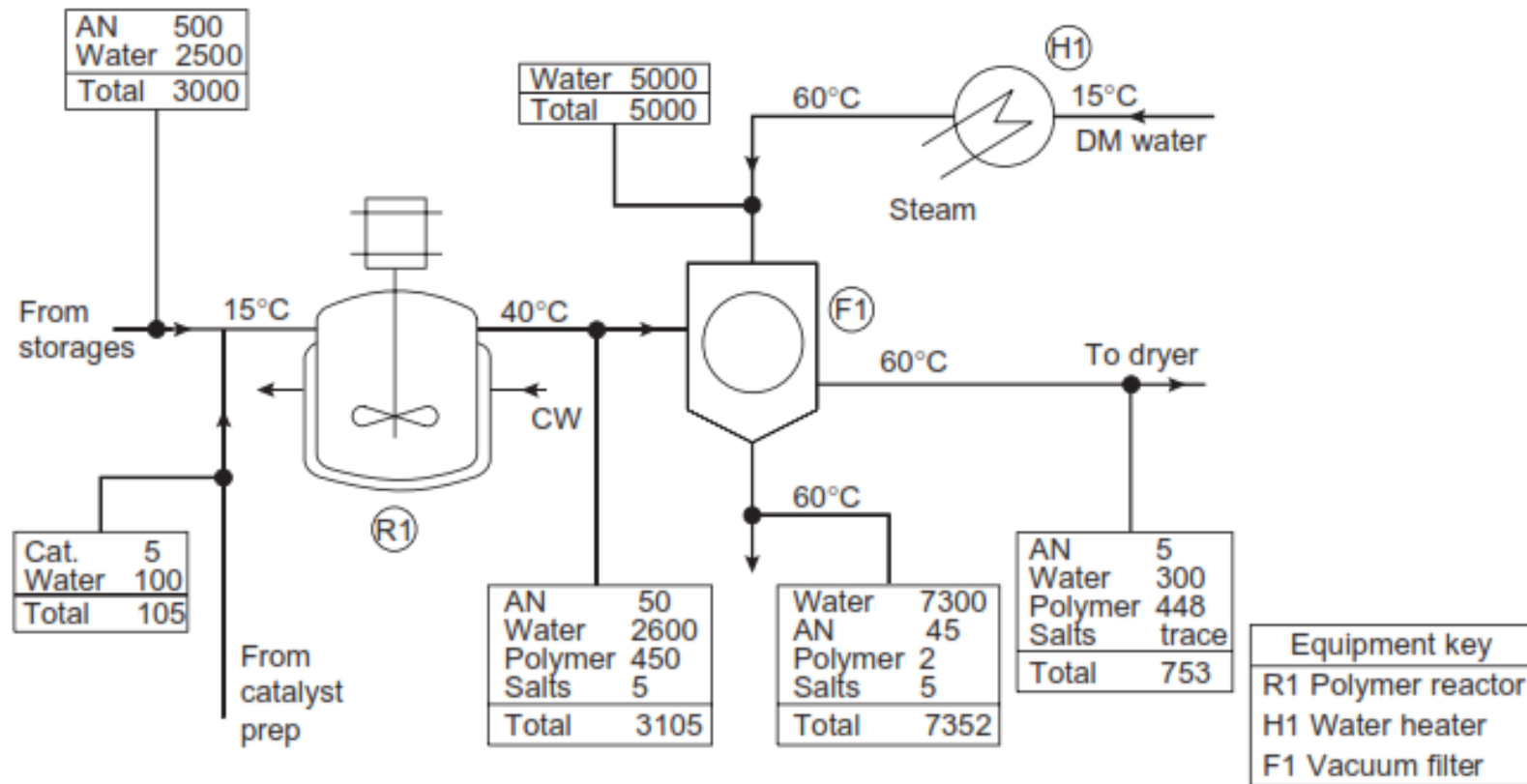


(g) Ejector

PFD symbols for fluid-handling equipment.



PFD symbols for solids-handling equipment.



Flowsheet: polymer production.

We shall come back the PFD, P&ID and Layout