

Cool Concepts

For Industrial Refrigeration Systems

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Piping & Instrumentation Drawings (P&ID's)

A good PSM program depends on high quality P&ID's to provide sufficient information about your refrigeration system.

In essence, the P&ID is the complete description of the refrigeration "process". These are provided in largely varying degrees of complexity or simplicity, but often lack key elements.

P&ID's in general should communicate the entire scope of the refrigeration system. A first consideration is to fully provide a visual association of all components, i.e., compressors, vessels, heat exchangers, valves (hand and control), and piping and instruments.

The drawings must provide the configuration of all components and their respective relationship in the system.

All piping within the refrigeration system must be shown on these drawings. The interconnecting piping between components and direction of flow are only primary considerations.

Refrigeration systems also have external piping such as relief valve vent lines, process

cooling water, and chemical treatment provisions that need to be incorporated in these drawings.

Additionally, the incorporation of vent, drain, and purge valves will also provide complete details and reduce the time for the development of standard operating procedures (SOP's).

"P&ID's in general should communicate the entire scope of the refrigeration system."

Line designations and purposes are another inherent requirement that provide detailed information. These descriptions can include pipe size, type of pipe material, wall thickness, and condition of service, i.e., liquid, dry suction, wet suction, discharge, etc.

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It is also helpful to have the design operating temperatures and pressures for each piping segment as well as the mass flow shown on the drawings.

This provides a concise listing of the design requirements and increases the operators understanding of the system operation.

In addition, each component should be provided with a distinctive and specific method of identification on the drawings (tag numbers).



Don't forget the following items on your P&I drawings:

- External piping such as relief vent lines
- Component & valve tag numbers
- Vent & drain valves
- Line designations, purposes, & flow direction arrows
- The condition of service, i.e., liquid, gas, or two-phase
- Design pressures & temperatures
- Equipment schedules
- Legends & keys to provide complete information
- Control loops

The component tag numbers provide a specific cross reference to SOP's and reduce operator error by eliminating vague instructions.

Fully documented drawing legends and keys should be provided for a clear and concise understanding of the symbols used in the drawing. It is also helpful to provide a complete description of the components shown on the drawings (equipment schedules).

A simple equipment schedule can be created to provide reference to equipment tag numbers, model numbers, and performance and design data.

The use of isometric-style drawings can be confusing and can obscure information that is relevant to the needs. Likewise, the use of graphics or CAD style representations for equipment does not provide sufficient detail for piping or instrumentation.

Additional details like control loops should be included to provide sufficient detail for interdependency of instruments to the controls.

It is also important to field verify the P&ID's for accuracy after the system is erected.

All of this is required to develop concise SOP's and process hazards analysis (PHA's) and helps to provide complete documentation for your refrigeration system.

Cold Systems, LLC provides technical assistance to owners and other users of refrigeration systems. Using our services will provide you with long-term value and benefits of:

- Energy reduction with increased efficiency & equipment capability, and
- Reduction of challenging issues & improved operational flexibility

We offer a broad range of services designed to promote safety, reliability, and cost effectiveness for refrigeration systems. You can rely on our 35 years of experience to help solve your problems and increase the cost-effectiveness of your refrigeration system .

