

Process Safety Information (PSI) Requirements

Process Safety Information includes information pertaining to:

- I. The hazards of the substances used or produced by the process;
- II. The technology of the process; and
- III. The equipment in the process.

I. Process Substance Hazards

1. Toxicity information
 - a. Permissible exposure limits
2. Physical data
3. Corrosivity data
4. Thermal and chemical stability data applicable to the process in which an EHS is being used, handled, stored or generated: stability (unstable or stable), conditions to avoid for instability, incompatibility (materials to avoid), hazardous decomposition (products or byproducts), hazardous polymerization (may occur or will not occur), and conditions to avoid for polymerization; and
5. Hazardous effects of inadvertent mixing of different materials that could foreseeably occur. Much of this information can be found in a Material Safety Data Sheet for the specific regulated substance.

II. Process Technology

1. Information concerning the technology of the process shall include at least the following:
 - a. A block flow diagram or simplified process flow diagram
 - b. Process chemistry
 - c. Maximum intended inventory
 - d. Safe upper and lower limits for such items as temperatures, pressures, flows or compositions
 - e. **The FRED:** A functional description of the process. This can be a narrative, a sequence of operations, or some other process engineer authored tool to describe clearly the intent and operation of the process equipment and its use as an interdependent system

III. Process Equipment

1. Process Flow Diagram
 - a. Simplified
 - b. With mass balance
 - c. With reaction heat balance
2. Process Chemistry
 - a. Cross-contamination consequences
 - b. Incompatible material review
3. Maximum intended inventory
 - a. Tank farms
 - b. In process
 - c. Sump volumes and mixture possibilities
4. Safe upper and lower limits
 - a. Normal control limits
 - b. Maximum percent of limits during uncontrolled process upset
 - c. Emergency shutdown natural resolution safe state
5. Materials of construction
 - a. Expected corrosion
 - b. Corrosion allowances
6. P&IDs
 - a. All regulated substance-containing equipment, including pressure vessels, tanks, heat transfer equipment, pumps, transfer/unloading stations, etc.
 - b. Essential valves, such as isolation valves and control stations, as well as all safety relief elements (valves, disks, etc.).
 - c. Controls (regulators, float switches, etc.) and solenoid valves.
 - d. Control schemes including interlocks, permissives, etc.
 - e. Permanent instruments and sensors (pressure/temperature/flow transducers, meters, etc.).
 - f. Flow direction: at a minimum, always show the permitted-flow direction on a check valve.
 - g. Line sizes/reducers; expansion tie-ins and block valves, etc.
 - h. Design working pressure and other pressure-vessel/equipment label information.
 - i. Support equipment and non-chemical lines such as condenser water pumps, secondary heat transfer fluid (glycol/brine) loops.
 - j. Equipment/valve numbering: Proper labeling, both on the P&ID and in the field, will reduce the risk of operator error and simplify the writing of the operating procedures.
 - k. Legend defining symbols and abbreviations.
 - l. Purge/gauge valves.
 - m. Line designations/purposes: some processes, such as refrigeration, have recognized systems for line designation. For others, use a system that explains the line's function and optionally includes other information such as temperature and pressure levels, etc.

- n. Safety relief valve specifications: information on the relief valve design and design basis is required before starting the PHA study.
- 7. Design Codes and Standards Applied
 - a. Building and occupancy classifications,
 - b. Piping
 - c. Electrical classification, supply and distribution systems
 - d. Mechanical
- 8. Safety Systems
 - a. Relief system design and design basis
 - b. Discharge network analysis
 - c. Flare or scrubbing capacities
 - d. Ultimate discharge modeling
 - e. Ventilation system design