

Piping and Instrumentation Diagram (P&ID) Checklist

15 problems that regularly show up in piping and instrumentation diagrams.

USE IT BEFORE

30 / 60 / 90% design reviews

Issue for review

Issue for construction

Model reviews

HAZOP preparation

Procurement release

Construction handover

Pre-commissioning and commissioning

Your project's approved design basis, engineering procedures, and drawing legend take precedence over any general convention listed here.

01 · CATEGORY

Line and piping.

1 Missing or inconsistent line numbers

A one-character slip cascades into takeoffs, isometrics, and procurement.

- ☐ Line number follows the project naming convention
- ☐ The same number runs the full route, including continuations
- ☐ The number matches the line list
- ☐ Parallel lines carry separate, correctly sequenced numbers
- ☐ No number is hidden behind a symbol or note

2 Unmarked piping specification changes

An undocumented spec break buys the wrong material.

- ☐ A spec-break symbol is shown at every change
- ☐ The correct spec is called out on each side of the break
- ☐ It is consistent with the piping class documentation
- ☐ Material, rating, corrosion allowance, and lining agree
- ☐ Insulation and heat-tracing requirements are correct

3 Size mismatches at connections

Check pumps, compressors, control valves, relief valves, and battery limits first.

- ☐ Line size matches the equipment nozzle where required
- ☐ Reducers are shown at every size change
- ☐ Branch connections are the correct size
- ☐ Valve sizes match the line and the valve datasheet
- ☐ Off-page connections carry the right size
- ☐ Instrument connections use the specified tubing or pipe size

4 Incorrect flow direction or valve orientation

A reversed check valve can hide until commissioning.

- ☐ Flow arrows match the process design
- ☐ Check-valve orientation is correct
- ☐ Control-valve direction is correct
- ☐ Pump suction and discharge are on the right sides
- ☐ Compressor suction and discharge are correct

02 · CATEGORY

Instrumentation.

5 Inconsistent instrument tags

Watch for swapped digits and bubble-versus-index mismatches.

- ☐ Tag uses the project numbering convention
- ☐ Tag appears in the instrument index
- ☐ Tag matches the instrument datasheet
- ☐ Tag is not duplicated elsewhere
- ☐ Tag holds through revisions
- ☐ Correct letter designation is used

6 Incomplete instrument loops

Not every loop has every element; intentional gaps should be documented.

- ☐ Every transmitter ties to a controller
- ☐ Every controller ties to a final control element
- ☐ Control valves show a signal or loop reference
- ☐ Local indicators are present where required
- ☐ Signal lines are complete
- ☐ Field-to-control-system connections are clear

7 Incorrect control valve fail position

A mismatch stays hidden until a functional or ESD test.

- ☐ Fail position is stated: open, closed, in place, or a defined position
- ☐ The position suits the service (cooling water fail-open, fuel gas fail-closed)
- ☐ It agrees with the valve datasheet
- ☐ It agrees with the control philosophy and cause-and-effect matrix

8 Incorrect signal or connection type

A line can look right and still carry the wrong signal.

- ☐ Signal type matches the control architecture (pneumatic, electrical, digital)
- ☐ Hardwired trips and software signals are distinguished
- ☐ Line style matches the project legend
- ☐ The instrument symbol matches the legend

03 · CATEGORY

Safety and operability.

9 Missing relief valve information

The P&ID need not hold the sizing math, but it must point to it.

- ☐ Relief valve tag and set pressure are shown
- ☐ Design pressure and discharge destination are shown
- ☐ Flare or relief-header connection is shown
- ☐ Block-valve and car-seal arrangement is shown
- ☐ Thermal relief protection is considered
- ☐ A datasheet or calculation reference is cited

10 Missing isolation around equipment and safety devices

Don't assume a nearby valve isolates; confirm location, rating, and position.

- ☐ Isolation around pumps, compressors, and control valves
- ☐ Isolation around instruments, filters, and strainers
- ☐ Isolation around heat exchangers and relief valves
- ☐ Drains and vents can be isolated
- ☐ Maintenance is possible without a full plant shutdown

11 Missing interlocks and shutdown functions

The P&ID must not contradict the cause-and-effect matrix.

- ☐ ESDs and high-high / low-low trips are referenced
- ☐ Equipment permissives and trips are shown
- ☐ Burner management functions are shown where relevant
- ☐ Level, pressure, and utility-failure responses are shown
- ☐ Operator alarms are shown

12 Missing or misplaced drains and vents

Easy to miss around complex equipment and piping.

- ☐ Located at the correct high and low points
- ☐ Connected to the right destination and properly rated
- ☐ Accessible for operation and maintenance
- ☐ Isolated where necessary
- ☐ Sample, flushing, and commissioning points are included

04 · CATEGORY

Cross-document consistency.

13 Differences between the P&ID and line list

Resolve every unexplained difference before issue.

- ☐ Line number, size, and spec agree
- ☐ Design pressure and temperature agree
- ☐ Fluid service agrees
- ☐ Insulation and heat tracing agree
- ☐ Test requirements and end points agree

14 Differences between the P&ID, instrument index, and datasheets

Most escapes happen after late changes.

- ☐ Equipment tags and names agree
- ☐ Nozzle references agree
- ☐ Instrument and valve tags agree
- ☐ Control functions and duty/standby arrangements agree
- ☐ Datasheet references and connection counts agree

05 · CATEGORY

Drafting and revision.

15 Dangling connectors and unclear revisions

A reviewer should trace every connection without guessing.

- ☐ Off-page connectors have matching references
- ☐ No line stops without a continuation symbol
- ☐ Revision changes are clearly identified
- ☐ Old revision clouds are removed
- ☐ Symbols match the project legend
- ☐ Text does not cover lines or symbols
- ☐ Line weights are consistent

MANUAL AND AUTOMATED REVIEW

Engineers have to judge design intent, operability, and safety, and that work is slow when the package is large. Automation is good at the repeatable part: duplicate tags, missing references, inconsistent line numbers, and differences between related documents. Use each for what it is good at.

Every finding traced to its source and governing requirement.

Hera reads the tags, line numbers, symbols, and connections on the sheet, compares them against your line list, instrument index, and datasheets, and brings the possible mismatches into one review. The engineer decides what is a real issue. Hera does not.

Backed by Y Combinator. Users in 18 countries.

See how Hera reviews P&IDs → heraengineering.com