# Top 30 Interview Questions & Answers

## ## Part 1: Fundamental Concepts

### *1. What is a pressure gauge?*

A pressure gauge is a mechanical instrument designed to measure and display the pressure of a fluid (a liquid or a gas) within a system. It provides a direct, local reading of the pressure.

### *2. What is the difference between gauge pressure and absolute pressure?*

- **Gauge Pressure (psig, barg):** Measures pressure **relative to the local atmospheric pressure**. A reading of '0' on a gauge means the pressure is the same as the surrounding air. This is the most common type of pressure measurement.
- **Absolute Pressure (psia, bara):** Measures pressure **relative to a perfect vacuum** (absolute zero pressure). It is equal to gauge pressure plus the current atmospheric pressure.

### *3. What is a vacuum?*

A vacuum is any pressure that is **less than the local atmospheric pressure**. On a standard gauge, it is read as a negative value. A **compound gauge** is designed to measure both positive pressure and vacuum on the same dial.

### *4. What is the main purpose of a pressure gauge in a plant?*

The main purpose is to provide **local indication** for operators and technicians. It allows them to:

- Verify a process is running at the correct pressure.

- Confirm the reading of an electronic pressure transmitter.
- Safely check for trapped pressure before performing maintenance.

### *5. What are the common units of pressure found on a gauge dial?*

The most common units are:

- **psi** (pounds per square inch)
- **bar**
- **kPa** (kilopascals) or **MPa** (megapascals)
- **kg/cm²** (kilograms per square centimeter) Many gauges have a **dual-scale** dial showing two different units, such as psi and bar.

## ## Part 2: Bourdon Tube Gauges

### *6. What is the most common type of pressure gauge?*

The **Bourdon tube** pressure gauge is by far the most common type used in industry due to its simplicity, reliability, and low cost.

### *7. What is the working principle of a Bourdon tube?*

A Bourdon tube operates on a simple mechanical principle. It contains a C-shaped, flattened metal tube that is open to the process pressure at one end and sealed at the other.

- When pressure enters the tube, it tries to **straighten out**, much like a coiled party horn when you blow into it.
- This straightening motion of the sealed end is transferred through a system of links and gears to a pointer on the dial.

- The amount of movement is directly proportional to the applied pressure.

### *8. What are the main components inside a Bourdon tube gauge?*

- **Bourdon Tube:** The C-shaped sensing element.
- **Socket:** The connection block that mounts to the process.
- **Linkage and Gears:** The mechanism that amplifies the small movement of the tube and converts it into a large rotation of the pointer.
- **Pointer and Dial:** The visual display for the pressure reading.
- **Case and Window:** The housing that protects the internal parts.

### *9. Why are some pressure gauges filled with liquid?*

The case is filled with a viscous liquid (usually **glycerin** or **silicone oil**) for two main reasons:

1. **Dampen Pulsation and Vibration:** The liquid acts as a shock absorber, preventing the pointer from fluttering and making it easier to read in high-vibration services (like near a pump or compressor).
2. **Lubricate the Mechanism:** The liquid lubricates the internal gears and links, reducing wear and extending the life of the gauge.

### *10. What is the purpose of the "blowout back" or "blowout disk"?*

This is a critical safety feature. It's a weak point in the back or top of the gauge case designed to rupture and safely vent the pressure out the back if the Bourdon tube ever leaks or bursts. This prevents the window from shattering and injuring an operator standing in front of the gauge. 💥

## ## Part 3: Other Gauge Types

# Pressure Gauges

### *11. What is a diaphragm pressure gauge?*

A **diaphragm gauge** uses a flexible, corrugated metal diaphragm as its sensing element. Pressure applied to one side of the diaphragm causes it to deflect, and this small movement is mechanically linked to the pointer.

### *12. When would you use a diaphragm gauge instead of a Bourdon tube?*

Diaphragm gauges are excellent for:

- **Low-pressure applications:** They are very sensitive and can accurately measure low pressures (e.g., in inches of water) that are too small for a Bourdon tube to register.
- **Corrosive or viscous fluids:** The large surface area of the diaphragm is less likely to clog than the small bore of a Bourdon tube. They are often used as part of a diaphragm seal assembly.

### *13. What is a bellows pressure gauge?*

A bellows gauge uses a thin-walled, accordion-like metal cylinder as its sensing element. The bellows expands and contracts like an accordion as the pressure changes. This movement is then used to drive the pointer. They are known for providing high accuracy and sensitivity, especially at low pressures.

### *14. What is a differential pressure (DP) gauge?*

A DP gauge measures the **difference in pressure between two points**. It has two process connections (a high-pressure and a low-pressure port). It's commonly used to measure the pressure drop across a filter or a strainer to see if it is getting clogged.

## ## Part 4: Selection and Application

### *15. How do you select the correct pressure range for a gauge?*

The golden rule is to select a gauge where the **normal operating pressure** falls in the **middle third (33% to 66%)** of the gauge's full-scale range.

- **Example:** If your normal operating pressure is 50 psi, you should select a 0-100 psi or 0-150 psi gauge.
- This ensures the best accuracy and prevents the Bourdon tube from being over-stressed.

### *16. What happens if you use a gauge with a range that is too low?*

You risk **over-ranging** the gauge. This can permanently deform the Bourdon tube, causing the gauge to be inaccurate, or in severe cases, cause it to rupture.

### *17. What happens if you use a gauge with a range that is too high?*

The gauge will be difficult to read accurately. Small but important fluctuations in the process pressure will barely move the needle. For example, trying to read 10 psi on a 0-1000 psi gauge is nearly impossible.

### *18. What are "wetted parts"?*

**Wetted parts** are all the components of the gauge that come into direct contact with the process fluid. For a standard gauge, this is the socket and the Bourdon tube.

### *19. Why is the material of the wetted parts important?*

The material must be **chemically compatible** with the process fluid to prevent corrosion.

- **Brass/Bronze:** Used for common utilities like air and water.
- **Stainless Steel:** The most common choice for general process fluids in the chemical and oil & gas industries.
- **Monel/Hastelloy:** Used for highly corrosive services like acids or sour gas.

### *20. How does dial size affect a pressure gauge?*

The dial size is chosen based on the required **readability**. A larger dial (e.g., 4.5" or 6") is used when the gauge needs to be read from a distance. A smaller dial (e.g., 2.5") is used for compact installations or on equipment panels.

## ## Part 5: Accessories and Installation

### *21. What is a block and bleed valve?*

This is a valve assembly installed under a pressure gauge.

- The **block valve** is used to isolate the gauge from the live process for safe removal.
- The **bleed valve** is used to vent the trapped pressure from the gauge *after* it has been blocked in. This is a critical safety step.

### *22. What is a pressure snubber?*

A **snubber** is a device that protects a gauge from pressure spikes and pulsations (like from a reciprocating pump). It contains a small restriction that dampens the fluctuations before they reach the gauge, preventing damage and making the pointer stable.

### *23. What is a siphon (or pigtail)?*

A siphon is a looped or coiled piece of tubing installed between the process and the gauge. It is used specifically for **steam service**.

- **How it works:** The siphon traps a slug of water condensate, which forms a protective barrier. This prevents hot, live steam from directly contacting and damaging the delicate mechanism inside the gauge.

### *24. What is a diaphragm seal?*

A **diaphragm seal** (or chemical seal) is a flexible membrane that isolates the gauge from the process fluid. It is used when the process fluid is:

- Highly corrosive.
- Very viscous or contains solids that could clog the gauge.
- Extremely hot or cold.

### *25. How should a pressure gauge be oriented?*

A standard pressure gauge is designed and calibrated to be read in the **vertical position**. Mounting it horizontally can introduce a small error due to the effect of gravity on the internal mechanism.

## ## Part 6: Calibration and Troubleshooting

### *26. Why do pressure gauges need to be calibrated?*

Over time, due to vibration, temperature cycles, and mechanical stress, the internal parts of a gauge can wear or shift, causing its reading to "drift." **Calibration** is the process of

comparing the gauge's reading to a known, accurate pressure standard and adjusting it to ensure it remains accurate.

### *27. How is a pressure gauge calibrated?*

1. Connect the gauge and a high-accuracy pressure calibrator (like a deadweight tester or a digital calibrator) to a pressure source (like a hand pump).
2. Perform an **"As Found"** check by applying pressure at several points (e.g., 0%, 25%, 50%, 75%, 100% of the range) and recording the gauge's error.
3. If needed, make adjustments (typically to the zero and span screws) to bring the gauge within tolerance.
4. Perform an **"As Left"** check to document the final accuracy of the gauge.

### *28. The pointer on your gauge is not on zero when there is no pressure. What's the problem?*

This is the most common issue. It could be caused by:

- **A minor calibration drift.**
- The gauge having suffered a slight **overpressure** event that bent the tube.
- A change in temperature. Many gauges have an adjustable pointer or a "zero adjust" screw on the outside to easily correct this.

### *29. What does it mean if a gauge pointer is stuck?*

A stuck pointer usually indicates a **mechanical failure** inside the gauge. The gears may be damaged or stripped, or the linkage may be broken. This is often caused by severe overpressure or vibration. The gauge needs to be replaced.

### *30. What are the signs that a pressure gauge is failing?*

- The pointer is not on zero.
- The pointer is stuck or does not move smoothly.

- The lens is fogged up or the case is full of process fluid (indicating a ruptured Bourdon tube).
- The reading is obviously incorrect when compared to a known condition or another instrument. 🔧