

# 50 Piping Interview Questions and Answers (2026 Edition)

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## Introduction

Whether you are a fresh engineering graduate or an experienced piping professional preparing for your next career move, this guide covers the most commonly asked piping interview questions and answers in 2026.

Piping engineering is a specialized discipline within the oil and gas, petrochemical, power, and construction industries. Interviewers typically test candidates on piping design, materials, codes and standards, pipe fittings, flanges, gaskets, and stress analysis.

This comprehensive guide is organized into 7 key topic areas, covering 50 questions with detailed answers — everything you need to walk into your next interview with confidence.

### Topics covered:

- Piping basics and definitions
- Pipe dimensions, sizes, and schedules
- Piping materials and specifications
- Pipe fittings types and uses
- Flanges and gaskets
- Piping codes and standards
- Stress analysis and design
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## Section 1: Piping Basics (Questions 1–8)

### Q1. What is the difference between a pipe and a tube?

A pipe is identified by its Nominal Pipe Size (NPS) and schedule, and is used primarily for conveying fluids. A tube is identified by its actual outside diameter and wall thickness, and is typically used in heat exchangers, instrumentation, and structural applications. The key difference is that pipe dimensions are nominal (not actual), while tube dimensions are exact.

### Q2. What is Nominal Pipe Size (NPS)?

Nominal Pipe Size (NPS) is a North American standard for pipe sizing. It is a dimensionless number that does not directly correspond to any actual pipe measurement. For NPS 14 and above, the NPS equals the actual outside diameter in

inches. For NPS 12 and below, the NPS is smaller than the actual outside diameter. The outside diameter remains fixed for a given NPS regardless of schedule (wall thickness).

### **Q3. What is pipe schedule?**

Pipe schedule refers to the wall thickness of a pipe. A higher schedule number means a thicker wall and therefore higher pressure rating. Common schedules include Sch 5, 10, 20, 40, 80, 120, 160, and XXS (Double Extra Strong). Schedule 40 is the most commonly used in general industrial applications. The schedule number is derived from:  $\text{Schedule} = (1000 \times P) / S$ , where P is the internal working pressure and S is the allowable stress.

### **Q4. What is the difference between seamless and welded pipe?**

Seamless pipe is manufactured by piercing a solid billet of steel through a mandrel to create the hollow pipe — it has no weld seam and is generally stronger and more reliable for high-pressure, high-temperature applications. Welded pipe (ERW — Electric Resistance Welded or SAW — Submerged Arc Welded) is made by rolling flat steel plate and welding the seam. Welded pipe is cheaper and available in larger diameters but may have lower pressure ratings than seamless pipe of the same wall thickness.

### **Q5. What is pipe class or piping class?**

A pipe class (or piping class) is a document that defines all components — pipe, fittings, flanges, valves, and gaskets — allowed for a specific combination of fluid service, pressure, temperature, and material. It ensures consistency and safety across an entire piping system. Pipe classes are project-specific and are developed based on applicable codes (ASME B31.3 for process piping, etc.) and the design conditions of the plant.

### **Q6. What is the difference between process piping and utility piping?**

Process piping carries the main process fluids — hydrocarbons, chemicals, steam — and is governed by codes such as ASME B31.3. It typically operates at higher pressures and temperatures and uses higher-grade materials. Utility piping carries supporting services such as cooling water, compressed air, potable water, and instrument air. It generally operates at lower pressures and uses lower-grade materials, and may be governed by ASME B31.1 (Power Piping) or local codes.

### **Q7. What does ASME B31.3 govern?**

ASME B31.3 is the Process Piping Code published by the American Society of Mechanical Engineers. It governs the design, materials, fabrication, assembly, erection, examination, inspection, and testing of piping in chemical plants, petroleum refineries, pharmaceutical facilities, and related industries. It is one of the most widely referenced piping codes globally.

### **Q8. What is a piping isometric drawing?**

A piping isometric drawing (or iso) is a three-dimensional representation of a piping system drawn on a 2D isometric grid. It shows the pipe routing, fittings, valves, supports, dimensions, and bill of materials (BOM). Isometrics are used for fabrication

and erection of piping spools and are extracted from the 3D piping model (e.g., in PDMS, AVEVA, or SP3D software).

□ **Tip:** Interviewers love asking about ASME B31.3 vs B31.1. Always clarify which code applies to the job you are interviewing for.

## Section 2: Pipe Dimensions and Schedules (Questions 9–15)

### Q9. What is the outside diameter (OD) of a 6-inch NPS pipe?

The outside diameter of a 6-inch NPS pipe is 6.625 inches (168.3 mm). This OD is constant regardless of the schedule (wall thickness). Only the inside diameter (ID) changes with schedule.

### Q10. How do you calculate the inside diameter of a pipe?

Inside Diameter (ID) = Outside Diameter (OD) – (2 × Wall Thickness). For example, a 4-inch NPS Schedule 40 pipe has an OD of 4.500 inches and a wall thickness of 0.237 inches, so  $ID = 4.500 - (2 \times 0.237) = 4.026$  inches.

### Q11. What is the difference between Schedule 40 and Schedule 80?

Both Schedule 40 and Schedule 80 have the same outside diameter for a given NPS, but Schedule 80 has a thicker wall. This means Schedule 80 has a smaller inside diameter and a higher pressure rating. Schedule 80 is used in higher-pressure applications and in corrosive environments where extra wall thickness provides allowance for corrosion.

### Q12. What is XXS pipe?

XXS stands for Double Extra Strong. It is a pipe schedule designation that indicates a very thick wall — thicker than Schedule 160. XXS pipes are used in extremely high-pressure applications, such as high-pressure steam lines, hydraulic systems, and critical process lines.

### Q13. What does DN mean in pipe sizing?

DN stands for Diamètre Nominal (Nominal Diameter), the metric equivalent of NPS. It is used in European and international piping standards. DN values correspond approximately to NPS values multiplied by 25 — for example, NPS 2 corresponds to DN 50, NPS 4 to DN 100, and so on.

### Q14. What is pipe bore?

Pipe bore refers to the inside diameter (ID) of the pipe. It is the actual flow path dimension. In some industries, pipes are specified by their bore rather than their NPS — for example, a pipe with a 4-inch bore means a pipe whose inside diameter is approximately 4 inches.

### Q15. How does wall thickness affect flow rate?

A thicker wall (higher schedule) reduces the inside diameter of the pipe, which reduces the cross-sectional area available for flow. For the same fluid velocity, a smaller bore pipe will carry less flow. Higher schedule pipes may also slightly increase pressure drop due to the reduced ID. Engineers balance pressure rating requirements against flow requirements when selecting pipe schedules.

□ **Tip:** *Keep a pipe schedule chart handy during preparation — interviewers often ask you to recall ODs and wall thicknesses for common pipe sizes.*

## Section 3: Piping Materials (Questions 16–22)

### Q16. What is ASTM A106 Grade B?

ASTM A106 Grade B is a specification for seamless carbon steel pipe for high-temperature service. It is one of the most commonly used pipe materials in refineries and petrochemical plants. Key properties: minimum tensile strength of 60,000 psi (415 MPa), minimum yield strength of 35,000 psi (240 MPa). It is suitable for temperatures up to approximately 425°C (800°F).

### Q17. What is the difference between carbon steel and stainless steel pipe?

Carbon steel pipe (e.g., ASTM A106) is the most economical option and is used for general service with non-corrosive fluids. It is susceptible to corrosion and rust. Stainless steel pipe (e.g., ASTM A312 TP316L) contains chromium and nickel, making it highly resistant to corrosion. It is used in corrosive services, food processing, pharmaceutical, and offshore applications. Stainless steel is significantly more expensive than carbon steel.

### Q18. What is ASTM A312 TP316L?

ASTM A312 TP316L is the specification for seamless and welded austenitic stainless steel pipe. The 'L' designation means low carbon content (maximum 0.03%), which reduces the risk of sensitization (chromium carbide precipitation at grain boundaries) during welding. Grade 316 contains molybdenum, which improves resistance to chloride pitting corrosion, making it suitable for marine and chemical environments.

### Q19. When would you use duplex stainless steel pipe?

Duplex stainless steel (e.g., UNS S31803, known as 2205) is used when both high strength and high corrosion resistance are needed — particularly in environments with chlorides, seawater, or acidic conditions. It has a two-phase microstructure (austenite + ferrite), giving it roughly twice the strength of standard austenitic stainless steel. Common applications include offshore platforms, desalination plants, and chemical processing.

### Q20. What is LTCS pipe?

LTCS stands for Low Temperature Carbon Steel. It refers to carbon steel materials that are impact tested at low temperatures to ensure toughness and resistance to brittle fracture. A common LTCS material is ASTM A333 Grade 6, which is impact tested at  $-46^{\circ}\text{C}$  ( $-50^{\circ}\text{F}$ ). LTCS is used in cryogenic, LNG, and cold climate applications where standard carbon steel would become brittle.

#### **Q21. What is the purpose of PWHT (Post Weld Heat Treatment)?**

Post Weld Heat Treatment (PWHT) is a controlled heating and cooling process applied to welded joints after welding is complete. Its purposes include: relieving residual stresses introduced during welding, softening the heat-affected zone (HAZ), improving ductility and toughness, reducing the risk of hydrogen-induced cracking, and meeting code requirements for certain materials and thicknesses. ASME B31.3 and ASME Section VIII specify when PWHT is mandatory.

#### **Q22. What is a P-number in piping?**

P-numbers are assigned by ASME to base metals (parent materials) to simplify welding procedure qualification. Materials with similar welding characteristics are grouped under the same P-number. For example, carbon steels such as ASTM A106 Grade B are P-number 1. When a welding procedure specification (WPS) is qualified for a P-number, it is generally valid for all materials within that P-number group.

### **Section 4: Pipe Fittings (Questions 23–30)**

#### **Q23. What are the main types of pipe fittings?**

The main types of pipe fittings include: Elbows ( $45^{\circ}$ ,  $90^{\circ}$ ,  $180^{\circ}$ ) for changing direction; Tees (equal and reducing) for branching; Reducers (concentric and eccentric) for changing pipe size; Couplings and unions for joining pipes; Caps and plugs for closing pipe ends; Crosses for four-way connections; Olets (weldolet, sockolet, threadolet) for branch connections. Each fitting type is available in various end connections: butt weld (BW), socket weld (SW), screwed/threaded (THD), and flanged.

#### **Q24. What is the difference between a long radius and short radius elbow?**

A long radius (LR) elbow has a centerline radius equal to 1.5 times the nominal pipe diameter (1.5D). A short radius (SR) elbow has a centerline radius equal to 1.0 times the nominal pipe diameter (1.0D). Long radius elbows produce lower pressure drop and less turbulence, making them the standard choice for most process applications. Short radius elbows are used where space is limited.

#### **Q25. What is the difference between a concentric and eccentric reducer?**

A concentric reducer has the same centerline for both the larger and smaller ends — it is symmetric. An eccentric reducer has one flat side, so the centerlines of the two ends are offset. Eccentric reducers are used in pump suction lines (flat side up) to prevent air

pockets, and in horizontal piping where you need to maintain a consistent bottom elevation (flat side down) for drainage.

#### **Q26. What is a weldolet?**

A weldolet is a self-reinforcing branch connection fitting used to create a 90° branch off a run pipe. It is butt-welded to the run pipe and provides full reinforcement of the branch opening, eliminating the need for a separate reinforcing pad. Weldolets are used when the branch-to-run ratio requires reinforcement per code, typically for larger branch connections and high-pressure services.

#### **Q27. What is the difference between a sockolet and a threadolet?**

A sockolet is a branch connection fitting with a socket weld end — the branch pipe is inserted into the socket and fillet-welded. It is used for smaller bore branches (typically 2 inches and below) in higher pressure services. A threadolet is similar in shape but has a threaded end — the branch pipe screws into the fitting. Threadolets are used for instrument connections, vents, and drains where threaded connections are acceptable.

#### **Q28. What is a stub-in connection?**

A stub-in (or stub-on) is a branch connection made by cutting a hole in the run pipe and directly welding the branch pipe onto the run pipe, without using a fitting. It is the most economical method for branch connections but may require a reinforcing pad (repad) to compensate for the material removed from the run pipe. Stub-ins are used when the branch-to-run size ratio is small and code calculations confirm adequate strength.

#### **Q29. What are butt weld fittings governed by?**

Butt weld pipe fittings are governed by ASME B16.9 (Factory-Made Wrought Butt-Welding Fittings). This standard covers dimensions, tolerances, ratings, and marking requirements for carbon and alloy steel butt-weld fittings from NPS 1/2 to NPS 48.

#### **Q30. What is the difference between a union and a coupling?**

Both unions and couplings are used to join two pieces of pipe. A coupling is a simple sleeve fitting — once welded or threaded, it cannot be easily disassembled. A union has three parts and can be disassembled without cutting the pipe, making it useful for maintenance where a component (such as a pump or valve) needs to be periodically removed. Unions are common in smaller bore piping and utility systems.

□ **Tip:** For fitting questions, always mention the relevant standard (ASME B16.9 for butt weld, B16.11 for socket weld and threaded fittings). This shows the interviewer you understand code compliance.

### **Section 5: Flanges and Gaskets (Questions 31–37)**

#### **Q31. What are the main types of pipe flanges?**

The main types of pipe flanges per ASME B16.5 are: Weld Neck (WN) — the most commonly used, butt-welded to the pipe with a long tapered hub; Slip-On (SO) — slides

over the pipe and is fillet-welded; Socket Weld (SW) — for small bore high-pressure piping; Blind (BL) — used to blank off a pipe end; Threaded — screwed onto the pipe, for non-welded connections; Lap Joint — used with stub ends for easy alignment and disassembly.

### **Q32. What is a flange rating (pressure class)?**

Flange pressure rating (class) defines the maximum allowable working pressure (MAWP) of a flange at a given temperature. Per ASME B16.5, flanges are classified in seven pressure classes: 150, 300, 600, 900, 1500, and 2500. A Class 300 flange can handle higher pressures than a Class 150 at the same temperature. As temperature increases, the allowable pressure rating decreases — these are shown in pressure-temperature (P-T) tables in ASME B16.5.

### **Q33. What are the types of flange facing?**

Common flange face types include: Raised Face (RF) — the most common; the gasket sits on a raised circular area. Flat Face (FF) — the entire face is flat; used with cast iron and non-metallic flanges. Ring Type Joint (RTJ) — uses a metal ring gasket in a groove; for high-pressure, high-temperature services. Male and Female (M&F) — one flange has a raised projection, the other a matching depression; for accurate gasket location. Tongue and Groove (T&G) — similar to M&F but with a narrower contact face.

### **Q34. What is the difference between a spiral wound gasket and a ring joint gasket?**

A spiral wound gasket (SWG) consists of alternating layers of metal (typically 316 SS) and soft filler material (graphite or PTFE) wound in a spiral pattern, with inner and outer rings for centering and compression control. It is used in Class 300 and above flanges. A ring joint (RTJ) gasket is a solid metal ring (oval or octagonal cross-section) that seats in a matching groove machined into the flange face. RTJ gaskets provide a very high-pressure and high-temperature seal and are used in Class 600 and above applications.

### **Q35. Why is a weld neck flange preferred over a slip-on flange?**

Weld neck flanges are preferred in critical, high-pressure, and cyclic service because: the butt weld provides full penetration and is easily radiographed (RT); the tapered hub distributes stress more evenly; they are stronger and more fatigue-resistant. Slip-on flanges are easier and cheaper to install but have fillet welds that are harder to inspect, and they have lower fatigue life. Slip-on flanges are used in lower-pressure, non-cyclic services.

### **Q36. What is a full-face gasket vs. a raised-face gasket?**

A full-face gasket covers the entire flange face including the bolt holes — it is used with Flat Face (FF) flanges, particularly when connecting to cast iron or bronze equipment. A raised-face gasket (ring gasket) only covers the raised face area of the flange — it is the standard gasket for Raised Face (RF) flanges in most industrial applications.

### **Q37. What is flange bolt torque?**

Flange bolt torque is the tightening torque applied to flange bolts to achieve the required gasket seating stress and create a leak-tight seal. The required torque depends on the

bolt diameter, bolt material, gasket type, flange class, and lubrication. Bolts are typically tightened in a cross-pattern sequence (star pattern) in multiple passes (30%, 70%, 100% of target torque) to ensure uniform gasket compression and avoid flange warping.

## **Section 6: Piping Codes and Standards (Questions 38–43)**

### **Q38. What is the difference between ASME B31.1 and ASME B31.3?**

ASME B31.1 is the Power Piping Code, covering piping in power plants, industrial plants, geothermal heating systems, and central heating/cooling systems. ASME B31.3 is the Process Piping Code, covering piping in chemical plants, petroleum refineries, pharmaceutical facilities, and related industries. B31.3 generally has more stringent requirements for examination and testing, particularly for high-purity and Category M (highly toxic) fluids.

### **Q39. What does ASME B16.5 cover?**

ASME B16.5 covers Pipe Flanges and Flanged Fittings from NPS 1/2 to NPS 24 in pressure classes 150 through 2500. It specifies dimensions, tolerances, materials, pressure-temperature ratings, and marking requirements. It is the primary standard referenced in almost all oil & gas and process industry piping specifications for flanges.

### **Q40. What is a hydrotest and why is it performed?**

A hydrostatic test (hydrotest) is a pressure test performed on a completed piping system by filling it with water (or another test fluid) and pressurizing it to 1.5 times the design pressure (per ASME B31.3) for a specified hold period — typically 10 minutes minimum. Its purpose is to verify the structural integrity of the piping system, check for leaks at joints and fittings, and confirm the system can safely withstand its operating pressure before being put into service.

### **Q41. What is a pneumatic test and when is it used instead of a hydrotest?**

A pneumatic test uses gas (air, nitrogen, or another inert gas) instead of water as the test medium. It is performed at 1.1 times the design pressure per ASME B31.3. Pneumatic testing is used when: the piping system cannot support the weight of water; the process fluid is water-sensitive (e.g., certain catalysts or chemicals); or complete drainage is not practical. Pneumatic testing carries higher risk than hydrotesting because compressed gases store much more energy — strict safety precautions are required.

### **Q42. What is NACE MR0175 / ISO 15156?**

NACE MR0175 (also published as ISO 15156) is the standard for materials for use in H<sub>2</sub>S-containing environments in oil and gas production. It specifies requirements for the selection and qualification of metallic materials to resist sulfide stress cracking (SSC), hydrogen-induced cracking (HIC), and stress-oriented hydrogen-induced cracking (SOHIC). Piping in sour service (containing H<sub>2</sub>S) must comply with this standard.

### Q43. What is the PED (Pressure Equipment Directive)?

The Pressure Equipment Directive (PED 2014/68/EU) is a European Union directive that sets the safety requirements for the design, manufacture, and conformity assessment of pressure equipment — including piping assemblies — operating at pressures above 0.5 bar. Equipment that falls under PED must be CE marked. It classifies equipment into categories (I through IV) based on increasing risk level, with higher categories requiring more rigorous third-party assessment.

□ **Tip:** *In interviews for European or international projects, expect questions on PED and CE marking in addition to ASME codes.*

## Section 7: Stress Analysis and Design (Questions 44–50)

### Q44. What is pipe stress analysis?

Pipe stress analysis is the engineering calculation process used to ensure that a piping system can safely withstand the loads and stresses imposed on it during operation, start-up, shutdown, and upset conditions. It evaluates stresses from internal pressure, deadweight (gravity), thermal expansion, seismic loads, wind loads, and dynamic loads (vibration, water hammer). Common software used includes CAESAR II, AutoPIPE, and ROHR2.

### Q45. What is thermal expansion in piping and why does it matter?

When a pipe is heated, it expands — and when it cools, it contracts. If this movement is restrained (by supports, equipment nozzles, or structures), it creates thermal stresses and forces on the pipe and connected equipment. Excessive thermal forces can damage equipment nozzles, crack welds, or cause the pipe to buckle. Engineers account for thermal expansion by installing expansion loops, expansion joints, or by carefully routing the pipe to allow natural flexibility.

### Q46. What is the difference between sustained stress and expansion stress?

Sustained stresses are caused by loads that act continuously — primarily internal pressure and deadweight (gravity load on the pipe, fluid, and insulation). These are checked against the hot allowable stress ( $S_h$ ). Expansion stresses are caused by thermal growth of the pipe — they are cyclic stresses that alternate between hot and cold conditions. These are checked against the allowable expansion stress range, which is calculated from both the hot ( $S_h$ ) and cold ( $S_c$ ) allowable stresses per code.

### Q47. What is a pipe support and what are the main types?

A pipe support is a structural element that holds the pipe in position, controls its movement, and transfers loads to the structure or ground. Main types include: Resting/Dummy supports — simply support the pipe weight; Guides — allow axial movement but restrict lateral movement; Anchors — restrict all movement (axial, lateral, and rotational); Spring hangers (variable and constant) — support the pipe weight while

allowing vertical movement due to thermal expansion; Snubbers — allow slow thermal movement but resist dynamic loads such as seismic or waterhammer.

#### **Q48. What is water hammer?**

Water hammer (also called hydraulic shock) is a pressure surge or wave caused by a sudden change in fluid velocity in a piping system — typically when a valve is closed quickly or a pump trips. The kinetic energy of the moving fluid converts to pressure energy, creating a pressure wave that travels through the pipe. Water hammer can cause pipe vibration, noise, joint leakage, and in severe cases, pipe rupture. It is mitigated by slow-closing valves, surge tanks, pressure relief valves, and proper system design.

#### **Q49. What is the purpose of an expansion loop?**

An expansion loop is a section of pipe deliberately routed in a U-shape or square loop to absorb thermal expansion. As the pipe heats up and expands axially, the loop bends and flexes, converting axial movement into bending — which is more easily absorbed without excessive stress. Expansion loops are used where natural flexibility in the pipe routing is insufficient to accommodate thermal growth, and where expansion joints are not preferred.

#### **Q50. What is the Caesar II software used for?**

CAESAR II (Computer Aided Stress Analysis Routing) is the industry-standard software used by piping engineers for pipe stress analysis. It models the piping system as a series of beam elements and calculates stresses, forces, moments, and displacements under various load cases (sustained, expansion, occasional). It checks results against applicable codes (ASME B31.1, B31.3, B31.4, etc.) and generates reports for engineering review and code compliance documentation.

□ **Tip:** *Caesar II is mentioned in almost every senior piping engineer job description. Even basic familiarity with it is a strong advantage in interviews.*

## **Conclusion**

These 50 piping interview questions and answers cover the core knowledge areas tested in almost every piping engineering interview — from basics and dimensions through materials, fittings, flanges, codes, and stress analysis.

The key to a successful interview is not just memorizing answers, but understanding the 'why' behind each concept. Interviewers are looking for engineers who can apply their knowledge to real problems on the job.

**Keep practicing, keep learning, and best of luck in your next interview!**

#### **Related articles on AI Engineer:**

- [Types of Pipe Fittings — Complete Guide](#)

- Pipe Dimensions and Schedule Chart
- What Is a P&ID Drawing? Beginner's Guide
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