Q&A PIPING

1. What is the responsibility of a piping inspector?
Ensure all piping work (material receiving, fabrication, fit-up, erection, testing & reinstatement) complies with project standard, specifications, approved drawings, procedures (ITP/SATIP/SAIC), and inspection plans.

Standard / Reference: SAEP-1150 – Inspection Coverage on Projects.

2. When the RFI required, and what documents are required during rise the RFI?
When RFI Is Required:
• To request inspection (Hold/Witness point) before proceeding work per ITP/SAIC.
• When clarification needed on specs/drawings/requirements.

Documents Required to Raise an RFI:
• RFI form with description, location, date/time & activity.
• SATIP/SAIC reference showing inspection point (Hold/Witness).
• Approved drawings (IFC/shop).
• Material documents (SAIC/MTC etc).

Standard / Reference: SAEP-1150 – Inspection Coverage on Projects (RFI timing/inspection).

3. Which SATIP for shop fabrication and checklist?
SATIP for Shop Fabrication:
• SATIP-L-350-08 – Shop Fabrication.

Main SAIC Checklists Used in SATIP-L-350-08:
• SAIC-L-2035 – Cutting & Assembly Fit-Up
• SAIC-L-2036 – Cold Bending
• SAIC-L-2037 – Hot Bending

Standard:
• SAIS-L-350 – Construction of Pipe

Standard / Reference: SATIP-L-350-08 – Typical inspection plan for shop fabrication.

4. **What is the requirements of orifice flange?**
• Orifice flanges must comply with ASME B16.36.
• Minimum Class 300 rating .
• Pressure taps: – Line ≥ 2″: use *flange taps*. – Line < 2″: use *corner taps*.
• Tap size: – ½″ for Class 600 & below. – ¾″ for Class 900.
• Tap connection type (threaded or socket weld) per piping spec.

Standard / Reference: SAES-L-109 – Flange requirements including drawing references.

5. How to check the angular alignment of both pipe?
• Check that pipe centerlines and angles match before welding.
• Use measuring tools (spirit level, angle/protractor, feeler/hi-lo gauge) to verify alignment.
• Adjust fit-up until within allowed tolerance (Root Gap: 3-4 mm, High-Low: 1.5 mm).

Tools:
• Angle/protractor gauge
• Hi-Lo gauge

Standard / Reference: SAES-L-350 Section 9 – Pipe Fit-up & Tolerances (alignment tolerances).

6. During line checking line are painted, and construction saying no remove painting, but QC saying remove the painting,so any requirements have paint removing?
• Yes, paint must be removed from the weld area and adjacent 25 mm before welding.
• Paint can stay on rest of pipe outside the welding zone.

Standard / Reference (below):SAES-W-011 – Welding requirements

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7. A 4" pipe threaded pipe how many joint should be engaged and where it's mentioned?
• For a 4″ threaded pipe,minimum 10 threads must be engaged and its mentioned in SAES-L-110 – "Limitations on Pipe Joints and Components"

Reference: SAES-L-110 – "Limitations on Pipe Joints and Components"

8. 3" pipe I am using sour service, it is acceptable ?
Yes, 3" pipe is allowed in sour service if it is butt-welded, but it is prohibited if the joints are socket-welded.

Reference: SAES-L-110 - "Limitations on Pipe Joints and Components"

9. What is the requirements of manifold during the hydrotest?
• Pressure Rating: Must be rated higher than the test pressure (usually 1.2 times the test pressure).
• Isolation: Must have a minimum of two isolation valves (Block and Bleed).
• Calibration: All components calibrations are present and not due like PSV, Gauge, Manifold etc
• Safety Valve: must be installed on the manifold and set at 5% to 10% above the test pressure to prevent over-pressurization.

Reference: SAES-A-004 (Pressure Testing) and GI 2.102 (Pressure Testing Safely).

10. What is the special requirements of SS pipe during hydrotest?
• Hydrotest water chloride must be ≤ 50 ppm to prevent pitting/stress corrosion on SS.
• SS piping hydrotest duration and lay- up must be as short as possible to reduce corrosion risk. < 4D
• After hydrotest, system must be flushed, drained and dried immidietly.

Reference: SAES-A-007 (Hydrostatic Testing Fluids and Lay-Up Procedures)

11. What is an Oxygen Scavenger?
• An oxygen scavenger is a chemical added to water or fluids to remove dissolved oxygen in order to prevent corrosion of metal surfaces in pipes, boilers and hydrotest water.
• It reacts with oxygen and chemically consumes it, stopping oxidation and pitting.

Standard / Reference (below):Reference: SAES-A-004

12. Difference between bolt torquing and bolt tensioning and where we get the tensioning value?
• Bolt Torquing: You turn the nut with a wrench. It uses friction to tighten.
• Bolt Tensioning: You stretch the bolt with a hydraulic tool, then spin the nut. It is more accurate because there is no friction.
• The value we get form ITP/SATIP, SAEP-351

Standard / Reference (below): SAES-L-109 (Selection of Flanges, Stud Bolts and Gaskets).

13. During installation of Valves what are the related documents and what inspections you do as a QC?
• P&ID / Isometric Drawing
• Vendor Test Reports.
• SAIC-L-2043 – Valve Installation Inspection
• SATIP-L-108-01 – Valve Installation Plan

QC Checks:
• Visual check for damage.
• Orientation & flow direction check.
• Leak test / hydrostatic test must be done
• Bolt torquing verification

Standard / Reference: SAES-L-108, 04-SAMSS-048, SATIP-L-108-01

14. NCR(major, moderate,minor)-which activity takes on this?
A Non-Conformance Report (NCR) is formally raised due to a Moderate Violation as defined by SAEP-381

Standard / Reference: SAEP-381.

15. Valve installation and testing Aramco standard?
• SAES-L-108 : Selection and Installation of Valves.
• 04-SAMSS-048: Valve Inspection and Testing
• API-598 : Testing of Valve

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Standard / Reference: SAES-L-108

16. Valves storage and preservation?
- Keep valves off the ground using pallets, shelves.
- Store in an approved area protected from dust, and severe weather.
- Inspect every 3 months for cap/seal integrity.
- Re-test any valve stored for more than 12 months before it is installed.
- Store Stainless Steel valves separately from carbon steel to prevent galvanic corrosion

Standard / Reference: SAEP-35

17. Water analysis reports how many days are valid?
- 7 days Maximum validity of a water analysis report for use in a test.

Standard / Reference: SAES-L-004

18. Pressure gauge calibration validity?
Pressure gauge calibration is valid up to 30 days

Standard / Reference: SAES-L-004

19. Flange fit up inspection?
- Flange faces straight & aligned faces. Max tilt allowed is 0.672 mm.
- Bolt holes aligned. Vertical, horizontal and rotational bolt hole offset: ± 2.4 mm
- Correct spacing between flanges is even and within tolerance. Max face seperation = ± 1.6 mm.
- Flange face must be clean & damage- free surfaces
- Gasket area clean, no scratches/dents.

Standard / Reference: SAES-L-108

20. Tell me about material preservation?
- Start preservation immediately after receipt to prevent damage or deterioration.
- Store properly (off the ground, protected from moisture, dust, climate, and corrosion).
- Follow manufacturer and project requirements for storage and protection.
- Inspect preserved materials regularly and take corrective action if needed.
- Maintain records of preservation and inspection activities.

Standard / Reference: SAEP-385

21. How to do inspection on spool laying?
- Material & Tag check – Spools must match isometric drawings.
- Internal cleanliness – Spools must be clean inside.
- Spool Alignment – Spools must be aligned per drawings.
- Flange fit-up – Flange faces clean, undamaged, and bolt holes aligned before bolting.
- End protection – Pipe ends must be covered prevent dust or moisture.
- Supports & placement – Pipes must be properly supported and positioned as per design.

Standard / Reference: SAES-L-350

22. A vertical 6" pipe can install the check valve?
No we can't install check valve on 6" pipe because as per SAES-L-108 check valve should not be installed NPS 3" and above

Standard / Reference: SAES-L-108

23. NCR procedure and one by one all stage need to describe?
- **Detect Non-Conformance**

Who: QC / Contractor
What: Spot work that doesn't meet specs
Action: Report it in QMIS

- **Issue NCR**

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Who: Client / Saudi Aramco (official)
QC Role: Provide evidence & details

- **Implement Corrective / Preventive Actions**

Who: Contractor
What: Fix the issue and prevent recurrence
QC Role: Verify actions are correct

- **Verify & Close NCR**

Who: QC verifies, Client officially closes
When: After all corrective/preventive actions are done and work meets specs (before ACD)
Memory: "Verify & officially close"

Standard / Reference: SAEP-381

24. What is preventive action, corrective action?

- **Corrective Action (CA):**

What: Fix a problem that already happened and prevent it from happening again.
Example: A pipe was installed wrongly → redo the installation and train the team.

- **Preventive Action (PA):**

What: Stop a problem before it happens.
Example: Check all pipes before installation to avoid wrong installation.

Standard / Reference: SAEP-381

25. Water analysis value?

Parameter	Required Test / Limit
Dissolved Oxygen (DO)	≤ 20 ppb
Oxygen Scavenger Residual	≥ 20 ppm
Chloride (Cl^-) Content	≤ 50 ppm
pH of Water	6-9

Standard / Reference: SAES-L-007

26. Package review?

- Prepare a complete package with all related drawings and docs.
- Submit the package with the Saudi Aramco. (through the eReview system)
- Aramco reviewers check the documents against standards, specs, codes.
- Reviewers send comments on non-compliances.
- You fix the comments and resubmit until all comments are closed.

Standard / Reference: SAEP-303 Engineering Reviews of Project Documentation

27. Who will rise the NCR?

The NCR is raised by PID.

Standard / Reference: SAEP-381 – Project Quality Issues Escalation Process

28. Fire water service Aramco?

It is the dedicated water supply system used for fire protection a network of water storage, pipes, valves and hydrants that delivers water at required flow and pressure.

Standard / Reference: SAES-B-017 — Fire Water System Design

29. As a Qc inspector How do you know for which system which type of layup will be used?

- Wet Layup : Short-term preservation (usually <30 days) for Carbon Steel
- Dry Layup: Long-term preservation of Carbon Steel.
- Inert Gas (Nitrogen) Layup: Stainless Steel or highly sensitive systems.

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- Ambient Layup : for Internally Coated/Lined pipes where corrosion is not a primary risk.

Standard / Reference: SAES- A- 007 (Hydrostatic Testing Fluid and Lay- Up Procedure).

30. During Spool pre fit up stage You as A qc find out there is a possibility of weld encroachment, What action will you take?

Note : Weld encroachment means two welds are too close

- Stop the fit-up work.
- Check spacing per Standard SAES- W- 011 (min 20 mm or 3× OD which one is greater).
- Report to QC/Supervisor.
- Adjust fit-up to meet spacing before welding.

Standard / Reference: SAES- W- 011 – Welding Requirements for on plot piping

31. During inspection of a Threaded pipe , what do you check in threaded pipes , the minimum counts of threads in a pipe as per Aramco standard, and which standard reference?

- Threads condition should clean and undamaged.
- Thread size must be correct as per ASME B1.20.1.
- Thread engagement should be correct.
- Proper sealing material used (no PTFE tape above 204 °C).

Pipe Size (Nominal)	Min Engaged Threads
½″ & ¾″	**6 threads**
1″ – 1½″	**7 threads**
2″ – 3″	**8 threads**
4″	**10 threads**

Nominal Size	Threads per Inch (TPI)
1/8″	27
1/4″	18
1/2″	14

Standard / Reference: SAES-L-110 , ASME B1.20.1.

32. How Will you know for this system Tensioning to be done instead of torquing?

Bolt Torquing

- Bolt diameter is small (typically ≤ 1″)
- Joint is general and non-critical joints (e.g., common piping flange).
- Bolting data sheet specifies a torque value to use.

Bolt Tensioning

- Bolt diameter is large (commonly ≥ ~1.5–2″)
- Critical or high-pressure joints (precision preload needed).
- Bolting data sheet specifies tension pressure/preload.

Standard / Reference: SAES-L-110 , ASME B1.20.1.

33. Standard for Preservation?

SAEP- 385 – *Preservation of Project Materials and Equipment*

34. **What are the requirements for dissimilar flange joints?**

- Lower flange rating limits joint
- Match flange face types
- Right gasket for face type
- Compatible materials

Standard / Reference: ASME B16.5 – Pipe Flanges and Flanged Fittings

35. What is the test package and its contents?

- Test Flow Diagram.

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- P & ID Marked.
- Isometric Marked.
- Test Limits.
- Water Analysis Report.
- Weld Joint Summary.
- NDT reports.
- Calibration Certificates of all components.
- Manifold Diagram and Calibration report.
- Pre-pressure test Check List (Punch List).
- Reinstatement report.
- Temporary blinds & Components & supports Identification.
- Bolt Torquing Report.
- Safety Sheet.
- Lay-Up method (If required)

Standard / Reference: SEAP-1160

36. How many days can we keep water in the system if hydro-test is hold?
- Untreated Water: 24 hours .
- Treated Water: 30 days.
- Carbon Steel Exception: <14 days.
- Stainless Steel: < 4 days.

Standard / Reference: SEAS-A-007

37. What is dead leg and what size and Standard?
- A dead leg is a stagnant area in a piping system where fluid does not circulate. Examples are high point vents, low point drains or closed lines
- A pipe is a Dead Leg if the stagnant length is:

Dead leg = length > 3× diameter or > 1.22 m (4 ft) (whichever is less).
- The standard for defining and designing dead legs in Saudi Aramco is SAES-L-310 (Design of Plant Piping).

Standard / Reference: SEAS-L-310

38. What is the test limit factor?
Test Limit Factor is the *lowest pressure- rating component* in system that *controls the maximum hydro-test pressure* can be applied.

39. Who approves manifold?
- Operating facilities: Approved by *Engineering Division Head*
- New construction: *Senior Supervisor or Client if involved*

40. Can we do Hydro-test with Valve Installed?/ Inspection requirement of valve in hydro-test?
- If the valve is rated for the hydro-test pressure.If not rated then remove it
- Soft-seated valves and control valves will not be used
- Valves kept in the test line shall be fully open

41. Can we store SS and CS materials together in preservation if not then why?
No, you cannot store them together.
The Reasons:
Contamination: Iron particles from CS rub off onto SS, making the stainless steel rust.
Galvanic Corrosion: When the two different metals touch, they create a chemical reaction that eats away the metal.

42. Up to what pressure rating we use for the raised face flange?
Raised Face (RF) flanges are generally used up to Class 600.

Standard/Reference : SAES-L-108

43. Can we do hydrotest with nrv ?
NRV is allowed on the hydro-test manifold, but NOT allowed inside the test boundary. NRV direction aligned with the flow.Pressure must not exceed nrv rating

Standard/Reference : SAES-L-150

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44. What is residual stress ?

Residual stress is the internal stress locked inside a material even when no external load is applied and the reasons are like

- Bolting
- Welding
- Cold bending

45. While doing bolt torquing, residual stress generates on the bolt?

Yes.Bolt torquing creates residual stress in the bolt.
When we torque a bolt, it stretches, and this stretch stays in the bolt as residual stress.

46. Q.C responsibility?

1. Surveillance & Monitor the activities as Site.
2. Work shall be executed as per Standards, Codes & Specification.
3. Work shall be done as Approved ITP / Drawings / IFC drawings (Issued for Construction).
4. Updated drawings shall be used at Site.
5. Raising RFI & Closing RFI.
6. Maintain the documents & reports on daily basis and update the data for tracing.
7. Perform internal inspections before raising RFI.
8. Assure availability of tools & Equipments during inspection.
9. Inspection of work done by Construction.
10. Witnessing & Monitoring during execution of work.
11. Work shall be carried out with Safety.
12. Tool box meeting & explaining the work to construction to maintain quality.
13. Issue NCR to construction whenever required.

47. Difference b/w P&ID and isometric?

P&ID shows how the system works; Isometric shows how the pipe is built and installed.

P&ID (Piping & Instrumentation Diagram):

- Shows flow, equipment and instruments
- Used for design, operation, and process understanding

Isometric Drawing:

- Shows routing, elevations, and welds
- Used for fabrication, installation, and inspection

48. Lay up procedure?

Lay up procedure basically clean, dry, protect and store piping to prevent corrosion during idle period.

49. Material receiving?

1) Match PO to Delivery Note.
2) Validate Vendor Approval.
3) MTC & Traceability.
4) Check for mechanical damage and ensure end protection
5) Verify Wall Thickness Schedule and OD
6) Prepare MRIR (inspection report)
7) Raise NCR for non-conforming items

Standard/Reference : SAEP-1150

50. Fitup procedure?

- Cleaning: Clean pipe ends and 1″ internal/external surface to remove rust, oil.
- Bevel Inspection:Bevel angle ~37.5°, check for cracks.
- Gap & Alignment check: Root Gap: 1.5–3 mm per WPS, Root Face : 1.6 mm, Hi-Lo (Misalignment): <1.5 mm
- Welding check: Welding should be done and NDT should be 100% clear.
- Dimensions check: Orientation and elevation checked against Isometric drawings.
- Proper Support: Proper supports to prevent residual stress during welding.

Standard/Reference: SAES-A-113, ASME B31.3

51. How to know the valve direction

- Check the P&ID uses a triangle symbol that points exactly where the liquid should go.
- Check the Isometric drawing have a small arrow next to the valve to confirm the installation direction at the site
- The Arrow Most valves (Check, Globe, Control) have a permanent arrow on body showing the flow direction.

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52. Tell me the hydro test procedure?
- Test Package Approval (Reviewing drawings and weld logs).
- Punch A must be cleared.
- Filling the water and high point venting.
- Pressurization (Raising pressure in stages: 30%, 60%, 100%).
- Depresurize the system.
- Draining and Layup.

Standard/Reference : SAES-A-007

53. Test Package procedure
- Documentation: Gather the P&ID, ISO drawings, MTC, and NDT Reports.
- Verification: Ensure every weld is signed off and passed inspection.
- Pucnch A: Clear all Punch A items before hydrotest.
- Approval: Get the package signed by QC and Aramco PID.

Standard/Reference : SAES-A-007

54. Lay up procedure Aramco standard
SAES-A-007 – Hydrostatic Testing Fluids and Lay-Up Procedures

55. Water analysis procedure
- Take water sample before hydrotest.
- Test water quality (chloride, oxygen, pH).
- Add chemicals if required.
- Confirm limits meet SAES.
- Record results in test package.

Standard/Reference : SAES-A-007

56. Aramco standard SAEP,SAES,SATIP
- **SAES (Saudi Aramco Engineering Standard):**

Technical engineering requirements (design, materials, construction, testing).
- **SAEP (Saudi Aramco Engineering Procedure):**

How to implement SAES (procedures, workflows, responsibilities).
- **SAIP / SATIP (Saudi Aramco Inspection Procedure):**

Inspection and testing requirements (what to inspect, when, acceptance criteria).

57. Before hydro what will be doing
- Complete fabrication
- Approve test package
- Install test blinds, supports & vents
- Remove sensitive items
- Verify water quality

58. What type of documents are required for material receiving?
- Purchase Oder
- Delivery Note
- IRC/IRN
- MTC

59. How will you know that the materials arrived in the shop are our project materials?
- Match PO number with project PO.
- Check heat number with MTC.
- Verify project ID on documents.
- Confirm size & grade with drawings.

60. What documents will we need for spool inspection at the shop and when we receive spool at site?
- At Shop (Fabrication): Approved Isometric Drawing, NDT reports, Weld map, WPS, MTC.
- At Site (Receiving):Approved Isometric Drawing, NDT & weld records

61. For sour service, what type of material testing is done?
- HIC (Hydrogen Induced Cracking) Testing

Checks for internal cracks inside the steel plate.
It ensures the "layers" of the steel don't peel apart when exposed to hydrogen.
Acceptance Criteria: Defined by SAES-L-133 (typically CLR $\leq$ 15%, CTR $\leq$ 5%, and CSR $\leq$ 2%).

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- SSC (Sulfide Stress Cracking) Testing
Checks for sudden breaking under tension (stress).
It ensures the pipe won't "shatter" or crack instantly when it's under pressure in a sour environment.
Standard: Tested per NACE TM0177.

62. How will you do segregation of materials in shop fabrication?
- Store and handle by material type/grade:
• Separate areas for carbon steel, stainless steel, alloy, etc.

- Use dedicated tools:
• Tools for SS/alloys must be separate from carbon steel tools.

- Prevent cross-contamination:
• Avoid contact of carbon steel racks/tools with stainless/alloys; protect contact surfaces.

63. What is the temperature at which impact testing for LTCS is done?
Impact test for LTCS is done at the MDMT (min design metal temp) or below per standard code requirements.
Example:
• If MDMT is **–46 °C**, impact test are tested at **–46 °C** or colder.

64. How do you do spool release?
- Inspection & NDT clearance – All spools must pass dimensional, welding, and NDT before release.
- Hydro/Pneumatic test done – Spool must be hydro tested per spec and no leaks.
- Tag & ID – Spool marked with line no., spool no., heat no., status (release).
- Protection & packing – Ends capped, flanges protected, and spool ready for transport.
- Documentation – Material certs, weld report, NDT reports, test certificates, and traceability records finalized.

65. Who approves manifolds? And what standard and which appendix is used for manifold approval?
- Approval authority:
• For new construction: Sr. Supervisor or PID approves test manifolds.
• For operating facilities: Engineering Division head approves test manifolds.

- Standard & Reference:
• Saudi Aramco Standard: SAES-A-004.
• Approval form: Appendix C – Manifold.

66. What is the line class and how do you interpret 1ST2P004?
First field – Pressure/flange class ie 1 = 150#
Second field – Material type ie ST = stainless steel
Third field – Corrosion allowance ie 2 = 3.2mm
Fourth field – Service type or special service modifier ie P = process line
Suffix/Series – Project-specific sequence or additional modifier ie line number = 004

67. What material codes have you worked on?
- **ASTM A53** – carbon steel pipe
- **ASTM A333** – low temperature carbon steel
- **ASTM A312** – stainless steel pipe (304/316)
- **ASTM A335** – alloy steel pipe (P5/P9/P11/P22)

68. During flange inspection, damage was found. How do you verify and which code refer?
- Measure: Use a depth gauge to find the exact depth. If deeper then allowed then rejected
- Refer : SAES-L-109, ASME PCC-1 Appendix D, ASME B16.5 & 47.

69. What is the minimum temperature of LTCS material?
Minimum temp of LTCS depends on the pipe. For ASTM A333 Gr. 1/Gr. 6 it is ~–45 °C; for very low-temp grades like Gr. 8/Gr. 11 it is ~–195 °C.

70. What u check in line checking of pipe.
- Verify size, routing and orientation match IFC isometric.
- Ensure internal pipe is clean before testing.
- All welds completed and 100% NDT cleared.
- Check valve direction, gasket type, and bolts (min. 2 threads).
- Confirm line class, schedule, and heat numbers against MTC.
- Verify supports are installed as per drawing.

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-- Line checking is physically checking that a piping system has been installed correctly as per approved drawing
-- A line class is a code that ensure all components in system are compatible
-- Schedule is wall thickness of pipe

71. What are category D and M fluids?

Category D fluid:
- Non-flammable
- Non-toxic
- Not damaging to human

Ex: Water and Nitrogen etc

Category M Fluid:
- Flammable
- Toxic
- Damaging to human

Ex: Hydrogen sulfide (H_2S) and Chlorine etc

72. Which document do you need in manifold fabrication?
- Manifold Diagram
- Welding log
- Calibrations
- P&ID
- ITP/SATIP
- MTC
- NDT

73. Spring support requirements?
- Spring supports hold the pipe and allow vertical movement..
- Spring should not change load too much when pipe heat up. Near pumps/compressor keep variation small (10–15%).
- Factory-installed stops are required to hold the pipe in cold position during installation.
- Keep stops locked while testing so springs don't move.

74. What is pickling?
- Chemical cleaning of pipe surfaces using acids to remove rust and welding oxides.
- Prepares pipes for coating, painting and prevents corrosion.
- Nitric acid – removes rust and oxides and Hydro fluoric acid (HF) – removes welding heat-affected zone

75. What you will do as a QC if water remain in stainless steel pipe more then 4 days?

If water stayed > 4 days in a stainless steel pipe, I will drain, flush, dry, and implement lay-up and check for corrosion, because water contact longer than permitted can lead to defects and corrosion.

76. SIS is mandatory for up to pressure and code

A SIS is required, there is no specific pressure number that makes it optional.
- *SAES-A-005 Safety Instruction Sheet* for static equipment
- SAES-L-125 Safety Instruction Sheet for piping systems/pipelines

77. What is SAES-H-002?
- SAES-H-002 sets the mandatory requirements for how steel pipes and fittings must be coated inside and outside.

78. Material storage and Handling code?
- SAES-H-200

79. Relief valve code?
- SAES-J-600 — Pressure Relief Devices
- Sizing and setting for pressure test relief valves must follow SAES-A-004

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80. Fire hydrant SATIP and SAES code?
- SAES-B-017 — *Fire Water System Design*, tells fire hydrant location, selection, rating, installation, and design.
- SATIP-B-019-01 — Portable Fire Protection Equipment Installation

81. Difference between normal flange and orifice flange fit-up procedure.
- **Normal flange:** A normal flange fit-up requires aligning the flange faces and bolt holes, placing a gasket, inserting bolts, and tightening evenly to make a solid sealed connection between pipes or equipment.
- **Orifice flange:** An orifice flange fit-up includes the normal flange steps plus orienting and aligning the pressure taps correctly, installing jack screws, and placing the orifice plate so flow can be measured accurately.

82. Why is the SIS sheet required during hydro tests?
The SIS is required because it provides the information of the system being tested including correct pressure, design limits, and safety data and ensures the hydro-test is done safely and per applicable codes.

83. What is liner measurement?
Linear measurement is the process of measuring length of pipe between two points. It is used to determine dimensions such as length, height, or width in engineering and construction.
Examples: measuring the length of a pipe, the height of a wall, or the distance between two points along a straight line.

84. How many required sloops in discharge.
- Surface drains (gutters, swales) must have at least 0.5 % slope.
- Storm drain pipes ≤ 750 mm diameter must have at least 0.25 % slope.
- Storm drain pipes > 750 mm diameter must have at least 0.15 % slope.

85. What is procedure spool installation?
1. Pre installation:
Spool as per isometric drawing & line number.
Spool should be internally clean.

2. Fit-up
Check alignment, elevation, orientation.
Flange and other components alignment correctly

3. Welding / Jointing
Weld as per approved WPS & SAES-W-011.
NDT must be cleared.

4. After installation
Hydro-test as per standard.
Re-instatement & final inspection.

Inspect → Clean → Fit-up → Weld → NDT → Bolt-up → Flush → Hydrotest

86. Categories of materials according to lay up?
· Cat I → Dry / Wet / Inert / Ambient allowed
· Cat II-A/B → Dry lay-up recommended
· Cat II-C/D/E → Ambient recommended
· Cat III → Ambient or any method

· Category I: Carbon steel (low corrosion resistance)
· Category II-A/B: Stainless steels sensitive to corrosion
· Category II-C/D/E: Corrosion-resistant alloys
· Category III: Highly corrosion-resistant materials

87. Where do we get water for HydroTesting?
· Hydrotest water from plant service water / temporary line / tanker
· Must meet SAES-A-007 water quality
· Test and approve before use.

88. What are the values of SRB and TCB and chlorine in the water hydro test?
· SRB (Sulfate Reducing Bacteria): ≤ 1,000 cells/mL
· TCB (Total Bacteria Count): ≤ 10,000 cells/mL

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· Chloride: ≤ 50 ppm

89. If you have an NCR of flang face damage what will you do?
Hold item → Measure damage → Raise NCR → Replace/repair with approval → Re- inspect.

90. What will be done after the work sheet?
Issue Worksheet → Investigate cause → Corrective action → QC verify → Submit evidence & close
Reasons:
· NCR not corrected by its Agreed Completion Date (ACD).
· NCR not approved by PID within 5 working days.
· Repeat of moderate violations.
· Forged documents/counterfeit materials.

91. What test will be conducted to count SRB , TCB and chlorine in water?
· SRB: MPN method (Most Probable Number) using SRB bottles/kits.
· TCB: Heterotrophic Plate Count (HPC) / Total bacterial count test.
· Chlorine: DPD colorimetric test kit (free & total chlorine).

92. What is PREN?
· PREN means Pitting Resistance Equivalent Number.
· It tells how strong stainless steel is against pitting corrosion (small holes from chlorides/seawater).
· Higher PREN = better corrosion resistance.
· Formula commonly used: PREN = %Cr + 3.3(%Mo) + 16(%N)

93. Types of violations in INCR?
· Material violation – wrong material, heat no., spec not matching MTC.
· Welding/fabrication violation – WPS not followed, welder not qualified, fit-up issue.
· Dimensional violation – tolerance, alignment, orientation out of spec.
· Procedure violation – approved method statement/ITP not followed.

94. How will you recognize the drawing used for fit up inspection is of the latest revision.
Check the drawing's title block for revision/date and confirm it must match the latest IFC from document control

95. SATIP for piping, valve installation
· SATIP-L-350-01 for piping installation
· SATIP-L-108-01 for valve installation

96. What is Schedule Q its contents and Attachments?
It is a contract between the client and the contractor that define the minimum quality requirements and how quality is controlled , managed and inspected.

Attachments:
· Attachment-I: Contractor and Sub Contractor personnel qualification.
· Attachment-II: Saudi Aramco standards & procedures.
· Attachment-III: Quality requirements for material
· Attachment-IV: Quality requirements for construction phase
· Attachment-V: Quality system deliverables.
· Attachment-VI: Project-specific quality requirements.

Main contents of Schedule-Q:
· General requirements
· Contractor Quality System requirements (QMS)
· Document Requirements
· Management Responsibilities
· Resource Management
· Project Execution
· Measurement analysis and improvements

97. For fit up what are the things you will check ?
· Correct drawing & latest revision
· Material grade, size, schedule, heat no.
· End prep & bevel angle as per WPS & Cleanliness
· Root gap, alignment, hi-low, level
· Joint number marking & traceability
· Tack weld by qualified welder
· Supports and orientation
· Flange alignment & gasket face condition

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98. What is PSZ?
PSZ (Pipe Support Zone) is the area around a pipe support where welding, cutting, or heat work is limited to prevent pipe stress or damage.

99. Standard used for Nut used in sour service?
- Bolt: ASTM A193 Grade B7M
- Nut: ASTM A194 Grade 2HM
- Standard: ANSI/ NACE MR0175/ ISO 15156

100. RFI for Valve installation?
When you raise an inspection request (RFI) for valve installation, you include basic details such as:
- Project/phase
- Scheduled date & time
- Description: Valve installation verification per SAIC-L-2043
- Contractor/inspector details etc

101. Procedure for Valve installation?
- Verify tag, size, rating, spec with drawing.
- Check damage + cleanliness before install..
- Ensure correct direction & orientation.
- No pipe stress on valve.
- Use correct gasket, bolts, torque.

102. How will you identify Soft Seated valves?
Check valve data sheet or body marking. If seat material is mentioned as PTFE, nylon, rubber or any non-metallic material, it means the valve is soft-seated.

103. Flange serration acceptance criteria?
- Serration depth approx 125–250 microns.
- Damage less than half serration depth → acceptable.

104. What is NMR 602?
NMR-602 is a Non-Material Requirement document that contains final drawings, datasheets, photographs, and approved material information that the vendor/contractor must submit to Saudi Aramco for review/record.

- NMR-601 – Preliminary Documents

Preliminary drawings and data submitted for review & approval before fabrication.
- NMR-602 – Certified Documents

Final certified drawings, photographs, parts data, etc. showing the actual material/equipment supplied.
- NMR-603 – Miscellaneous Documents

Operations & maintenance manuals, installation instructions, test certificates, commissioning data, etc.

105. What is Nitrogen purity in inert lay up?
For inert lay-up per SAES-A-007, nitrogen must be high-purity dry N_2 (typically ≥99% or higher) to protect against corrosion and water ingress.

106. How much branch connection can we take from the pipe?
There is no fixed number of branches allowed for a pipe. You can take branches as long as they meet the spacing and reinforcement criteria
For example, when branches are close, their centers must be at least 1.5 × branch diameter apart and the reinforcement between them must be suitable per ASME B31.3.

Practical rule-of-thumb (not code):
- ≤ 2″ header → ~ 1–2 branches
- 3″–4″ header → ~ 2–3 branches
- 6″–8″ header → ~ 3–4 branches

107. SATIP for pipe cleaning?
- SATIP-A-004-02 internal cleaning of pipe
- SAIC-L-2017 internal cleaning checklist
- SATR-L-2008 internal cleaning report

108. How do we rolling in a fabrication shop?
Rolling is a metal forming process where metal is passed between rollers to change its shape.
Use rolling machine => metal between rollers => adjust rollers => feed the plate until the required shape formed.

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109. What is the formula for linear measurements?

Linear measurement in piping is just the straight- line distance between two points
Distance = |end point − start point|.

110. As a QC inspector what do we check in a spool NDT report ?'

- Correct weld/spool ID matches drawing.
- NDT method used (RT, UT, PT, MT) is listed.
- Procedure & acceptance criteria.
- Pass/fail results with any defects noted.
- Inspector is qualified & signed the report

111. What is SAES-L-125?

SAES- L- 125 is Safety Instruction Sheets (SIS) for piping and pipeline systems. It tells you how to create SIS the safe operating limits, protective devices and special safety precautions for piping in new or existing facilities.

112. What are the documents to be checked before spool release

- Spool identification & isometric match
- MTCs for pipe/fittings
- Welding records.
- NDT reports
- PWHT (if required)
- Spool release report signed by QC
- Visual & dimensional inspection records
- Traceability Records (heat numbers & tags)

113. Corrosion allowance for piping?

On the base of line class

- 0 = 0 mm (ss)
- 1 = 1.6 mm (cs)
- 2 = 3.2 mm (cs)
- 3 = 4.8 mm (high corrosion cs)
- 4 = 6.4 mm (burried cs)

114. What are the two activities as per SAES-L-350-01 you will check before fit up?

Before pipe fit- up on plot (installation), you must check:

- Internal cleanliness of piping.
- Flange joint and gasket/bolt tightening procedure review.