
Q605 - Steam Plants

1. According to the data given in the illustration which of the following would be the physical state of the fluid at a gauge vacuum of 25.03 inches Hg, and 126.08 degrees Fahrenheit

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Properties of Saturated Steam

Vacuum Inches of Hg Gage	Temperature °C	Temperature °F
29.51	11.74	53.14
29.41	15.17	59.30
29.31	18.04	64.47
29.21	20.52	68.93
29.11	22.70	72.86
29.00	24.66	76.38
28.90	26.43	79.58
28.70	29.56	85.21
28.49	32.27	90.08
28.29	34.66	94.38
28.09	36.80	98.24
27.88	38.74	101.74
27.48	42.18	107.92
27.06	45.14	113.26
26.66	47.77	117.99
26.26	50.13	122.23
25.85	52.27	126.08
25.44	54.23	129.62
25.03	56.05	132.89
24.63	57.74	135.94
24.22	59.33	138.79
23.81	60.82	141.48
22.79	64.21	147.57
21.78	67.21	152.97
20.76	69.91	157.83
19.74	72.36	162.24
18.72	74.61	166.30
17.70	76.70	170.06
16.69	78.64	173.56
15.67	80.47	176.85
14.65	82.14	179.86
13.63	83.81	182.86
12.61	85.36	185.64
11.60	86.82	188.28
10.58	88.22	190.80
9.56	89.57	193.21
7.52	92.08	197.75
5.49	94.42	201.96
3.45	96.60	205.88
1.42	98.64	209.56

Adapted for testing purposes only

- Saturated liquid.
- Mixture of saturated liquid and vapor.
- **Subcooled liquid.**
- Superheated vapor.

Note:
The saturation temperature at a vacuum of 25.03 inches Hg is 132.89F. Since the fluid's temperature (126.08F) is below this saturation temperature, it exists as a subcooled liquid.

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2. Steam line water hammer can be best prevented by _____.

- always opening steam valves rapidly
- replacing all 90° elbows with capped tees
- keeping steam temperature below the saturation point
- **keeping lines drained and insulated**

Note:
Water hammer is prevented by keeping lines drained and insulated to minimize condensate accumulation and sudden slug movement.

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3. An excess pressure governor would normally be used on a _____.

- **turbine-driven feed pump**
- forced draft fan
- low-pressure propulsion turbine
- main circulator pump

Note:
Excess pressure governors are used on turbine-driven feed pumps to prevent discharge pressure from exceeding safe limits by automatically throttling steam to the driving turbine.

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4. The constant pressure governor of a turbine-driven feed pump maintains which of the following pressures at a constant value for all capacities?

- **Pump discharge**
- Pump suction
- Turbine exhaust
- Turbine inlet

Note:
A constant pressure governor regulates pump discharge pressure by adjusting turbine steam admission to maintain a constant value across varying flow rates.

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5. Under EMERGENCY operating conditions with the main feed valve malfunctioning, what should be the proper valve positions for controlling feedwater to the boiler?

- auxiliary stop-check valve fully open and the auxiliary stop valve regulated by the feedwater regulator
- auxiliary stop and stop-check valves fully open and the feed pump speed used to regulate the amount of flow
- **auxiliary stop valve fully open and the auxiliary stop-check valve used to regulate the amount of flow**
- auxiliary stop-check valve fully open and the auxiliary stop valve used to regulate the amount of flow

Note:
During emergency feedwater control with a malfunctioning main feed valve, the auxiliary stop valve should be fully open, and the auxiliary stop-check valve used to regulate feedwater flow. This configuration prevents backflow and protects the stop valve from erosion, while allowing manual adjustment of boiler water level.

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6. If it should become necessary to abandon a compartment because of the danger of a large steam leak on a boiler, which of the following actions represents the best avenue of escape?

- Use fireroom elevator to an upper deck.
- **Escape through another compartment on a lower level.**
- Escape by way of a fireroom ladder to the outer deck.
- Escape through another compartment on a higher level.

Note:
To escape a compartment with a large steam leak, moving laterally into a lower-level compartment provides the safest route by avoiding the upward flow of hot steam and placing a barrier between you and the hazard; elevators and upward routes expose individuals to the most dangerous conditions, while a lateral move to a lower level offers cooler air and a secure escape path.

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7. In what section of a boiler would you find a steam quality of 90%?

- Last pass of the superheater
- Desuperheater outlet
- **Steam drum**
- Superheater outlet

Note:
Wet saturated steam, characterized by a 90% steam quality, is a mixture of vapor and liquid and is found within the steam drum of a boiler.

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8. Which of the following statements represents the purpose of boiler sliding feet?

- **To accommodate the changing length of the water drum as it expands or contracts with temperature changes.**
- To allow for unequal expansion between the wrapper and tube sheets.
- To ensure an airtight seal between the boiler inner and outer casings.
- To compensate for deflection of the hull in way of the boiler supports.

Note:
Sliding feet accommodate thermal expansion and contraction of the water drum, preventing stress on the drum and supports. Steel expands with heat, and sliding feet allow longitudinal movement to relieve this stress. This function is distinct from managing expansion between boiler components, maintaining airtight seals, or compensating for hull deflection.

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9. Steam baffles are used in the steam drum of a water-tube boiler to _____.

- remove boiler water dirt deposits
- **reduce the possibility of carryover**
- support the drum safety valve nozzles
- extend the internal feed pipe

Note:
Steam baffles in a water-tube boiler's steam drum separate moisture from steam, reducing water carryover. This prevents damage to downstream equipment and is not related to dirt removal, safety valve support, or feed pipe extension.

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10. Scavenging air lines are connected to boiler stack periscopes to _____.

- keep the periscope tubing from warping
- **prevent stack gases from contaminating the periscopes internal components**
- maintain a negative pressure in the periscope line
- keep the mirrors from misaligning

Note:
Scavenging air in boiler stack periscopes prevents contamination of internal components by stack gases.
