
Q513 - 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. Coast Guard Regulations (46 CFR Part 56) permit copper pipe to be used for steam service subjected to a maximum pressure and temperature of _____.

- 350 psi and 460°F
- 350 psi and 406°F
- 250 psi and 460°F
- **250 psi and 406°F**

Note:
Coast Guard Regulations (46 CFR Part 56) limit copper pipe use in steam service to a maximum pressure and temperature of 250 psi and 406F.

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3. Coast Guard Regulations (46 CFR) regarding hydrostatic testing of main steam piping state that _____.

- **the hydrostatic test shall be applied from the boiler drum to the throttle valve**
- not less than fifty percent of the lagging shall be removed each time the hydrostatic test is applied
- the hydrostatic test pressure must be maintained on the piping for a minimum of one hour
- a pipe with a nominal size of six inches or more is not required to be hydrostatically tested

Note:
Coast Guard regulations require hydrostatic testing of main steam piping to extend from the boiler drum to the throttle valve, ensuring the entire high-pressure path is tested.

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4. 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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5. The steam separator as used in conjunction with a steam whistle normally drains to which of the listed drain systems?

- Main turbine
- Low-pressure
- Contaminated
- **High-pressure**

Note:
The steam separator drain from a steam whistle, operating at boiler or auxiliary steam pressure, must discharge into the ship's high-pressure drain system designed for those pressures.

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6. The leakage of air into the pump casing by way of the packing gland of a condensate pump, is prevented by _____.

- **a water seal line to the packing gland**
- an air seal line from the compressed air line
- special packing in the stuffing box
- the vacuum in the pump suction

Note:
Air leakage through a condensate pump's packing gland is prevented by a water seal line to the packing gland, which floods the packing and blocks air ingress due to the vacuum on the pump suction.

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7. Which of the conditions listed could prevent a centrifugal condensate pump from developing its rated capacity?

- Flooding of the main condenser hotwell.
- Operating the pump with a positive suction head.
- Venting the pump to the vacuum side of the condenser.
- **Closing the water seal line to the packing gland.**

Note:
Closing the water seal line to the packing gland allows air to enter the pump, leading to air-binding and preventing it from achieving its rated capacity.

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8. If a lube oil pump fails to build up discharge pressure, the cause could be the _____.

- bypass valve is closed
- suction vacuum is high
- **suction valve is closed**
- discharge valve is open

Note:
A closed suction valve prevents oil from entering the pump, resulting in a failure to build discharge pressure.

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9. High pressure and low pressure drain systems are part of the _____.

- **condensate drain system**
- auxiliary turbine bleed system
- contaminated drain system
- boiler drain system

Note:
High and low pressure drain systems manage clean condensate and are components of the condensate drain system.

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10. From which of the areas listed are condensate drains normally collected and returned to the low-pressure drain system?

- Each main feed pump steam supply line
- **Main and auxiliary air ejector aftercondensers**
- Steam whistle separator/trap
- Steam systems operating in excess of 150 psi

Note:
Condensate from main and auxiliary air ejector aftercondensers is collected and returned to the low-pressure drain system because it is low-pressure and designed for recovery in that system. High-pressure steam lines, steam whistles, and systems above 150 psi utilize separate drain systems.
