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Q740 - Engineering Safety & Environmental Protection

1. A three inch overboard discharge line, located six feet below the waterline, has ruptured and separated from the hull. What would be the minimum number of strokes per minute required from a 8" x 12" x 12" duplex double acting reciprocating bilge pump, operating at 82% efficiency, to keep the bilge level from continuing to rise

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Flow of Gallons of Water Per Minute (gpm) Through Various Hole Diameters (in) at Various Heads (ft) of Water

	2 ft	4 ft	6 ft	8 ft	10 ft	12 ft	14 ft	16 ft
1 in	28 gpm	40 gpm	49 gpm	56 gpm	63 gpm	69 gpm	74 gpm	79 gpm
2 in	111 gpm	157 gpm	192 gpm	222 gpm	248 gpm	272 gpm	294 gpm	314 gpm
3 in	250 gpm	354 gpm	433 gpm	500 gpm	559 gpm	612 gpm	661 gpm	707 gpm
4 in	445 gpm	629 gpm	770 gpm	889 gpm	994 gpm	1089 gpm	1176 gpm	1257 gpm
5 in	695 gpm	982 gpm	1203 gpm	1389 gpm	1553 gpm	1701 gpm	1837 gpm	1964 gpm
6 in	1000 gpm	1414 gpm	1732 gpm	2000 gpm	2236 gpm	2449 gpm	2646 gpm	2828 gpm
7 in	1361 gpm	1925 gpm	2357 gpm	2722 gpm	3043 gpm	3333 gpm	3601 gpm	3849 gpm
8 in	1777 gpm	2514 gpm	3078 gpm	3555 gpm	3974 gpm	4354 gpm	4702 gpm	5027 gpm
9 in	2249 gpm	3181 gpm	3896 gpm	4499 gpm	5030 gpm	5510 gpm	5951 gpm	6362 gpm
10 in	2777 gpm	3927 gpm	4809 gpm	5553 gpm	6209 gpm	6802 gpm	7347 gpm	7854 gpm

- **45 strokes per minute**
- 56 strokes per minute
- 87 strokes per minute
- 98 strokes per minute

Note:

The pump must deliver approximately 45 strokes per minute to match the flooding rate and prevent the bilge from rising, based on a calculated inflow of 192 gallons per minute through a likely 2-inch rupture at a 6-foot head.

2. In a compartment that has been completely flooded with water, the greatest pressure will be exerted _____.

- at a point that is one-third from the bottom of the bulkhead
- at the vertical center of the bulkhead
- **along the bottom of any bulkhead**
- along the top of the bulkhead

Note:

Hydrostatic pressure increases with depth; therefore, the greatest pressure in a flooded compartment is exerted along the bottom of any bulkhead.

3. If a cargo tank has not been certified as gas free, _____.

- breathing apparatus would not be necessary in an emergency as you would only be in the tank a short time
- entry without a breathing apparatus may be made at the top of the tank since petroleum vapors are heavier than air
- **breathing apparatus should always be used**
- a man may work safely without breathing apparatus in cold weather, as vapors are less volatile

Note:

A cargo tank lacking gas-free certification presents a potentially toxic or oxygen-deficient atmosphere, mandating the use of breathing apparatus for entry.

4. To avoid excessive pressures in the fuel oil filling system during bunkering, you should _____.

- **reduce the loading rate when topping off**
- top off all tanks at the same time
- fill one tank at a time
- close the tank filling valves quickly

Note:

Reducing the loading rate when topping off prevents excessive back pressure and surge pressures in the bunkering system.

5. During fueling operations oil is detected in the water adjacent to your vessel. If however, it is determined to be from some source other than your vessel, you should _____.

- secure operations until the exact type of oil is determined
- **notify the Coast Guard**
- make an entry in the Oil Record Book to that effect
- all of the above

Note:

Observed oil pollution must be reported promptly for investigation and cleanup; therefore, the Coast Guard should be notified even if the source is not your vessel.

6. After fuel tanks have been filled and bunkers completed, which of the listed procedures should be followed next?

- The tanks should be marked with a bull stamp on the manifold filling valve.
- The pressure-vacuum relief valve should be reset.
- The tanks should be made seaworthy to prevent contamination.
- **The tanks should be sounded to verify levels.**

Note:

Sounding tanks after bunkering verifies fuel levels and quantity, confirming no overfills or leaks.

7. If the overflow tank high-level alarm sounds while the fuel oil tanks are being topped off, the engineer should _____.

- close the static leg filling valve
- **stop the fuel oil pumping operation**
- reduce the fuel oil pumping rate
- close the overflow tank filling valve

Note:

A high-level alarm in the overflow tank indicates imminent overfilling; therefore, the fuel oil pumping operation must be immediately stopped to prevent overflow and potential pollution.

8. Pollution Prevention Regulations (33 CFR) specify that the person in charge of bunkering is responsible for the _____.

- quantity of fuel received
- **communications with terminal operator**
- quality of fuel received
- vessels draft

Note:

Pollution Prevention Regulations (33 CFR) designate the person in charge of bunkering as responsible for maintaining communications with the terminal operator to ensure safe fuel transfer and prevent pollution.

9. According to the Pollution Prevention Regulations (33 CFR), no person may transfer oil to or from a vessel unless each person in charge has signed the _____.

- Valve Inspection Record
- Certificate of Inspection
- Oil Record Book
- **Declaration of Inspection**

Note:

33 CFR regulations require each person in charge to sign the Declaration of Inspection before any oil transfer occurs.

10. In accordance with 33 CFR Subchapter O (Pollution), who makes the final decision of when oil transfer may begin?

- The senior deck officer present
- **The designated person in charge**
- Any local Coast Guard representative
- The captain of the port

Note:

Oil transfer operations, as per 33 CFR Subchapter O, may only begin when authorized by the designated person in charge, who ensures all required conditions are met.
