

U.S.C.G. Merchant Marine Exam

OSV-Assistant Engineer

Q653 Engineering Safety-Environmental Protection

(Sample Examination)

Choose the best answer to the following Multiple Choice Questions

1. Before entering a fuel tank that has been cleaned, it should be checked with an oxygen indicator and a/an _____.

- (A) halide torch
- (B) flame safety lamp
- (C) Orsat apparatus
- (D) combustible gas indicator

If choice D is selected set score to 1.

2. A hand portable CO₂ fire extinguisher is effective on burning oil only _____.

- (A) if applied in connection with foam
- (B) to prevent rekindling
- (C) if applied promptly
- (D) if attempts to extinguish the fire with low velocity fog have failed

If choice C is selected set score to 1.

3. Static water pressure on the hull of a ship is greatest at the _____.

- (A) bow
- (B) stern
- (C) boot topping
- (D) keel

If choice D is selected set score to 1.

4. The important stability parameter "KG" is defined as the _____.

- (A) height of the center of buoyancy above the keel
- (B) height of the center of gravity above the keel
- (C) metacentric height
- (D) height of the metacenter above the keel

If choice B is selected set score to 1.

5. Stability is determined principally by the relationship of the center of gravity and the _____.

- (A) keel
- (B) center of buoyancy
- (C) center of flotation
- (D) aft perpendicular

If choice B is selected set score to 1.

6. All of the following are part of the fire triangle EXCEPT _____.

- (A) fuel
- (B) oxygen
- (C) heat
- (D) electricity

If choice D is selected set score to 1.

7. In accordance with 33 CFR Subchapter O, shipboard pollution prevention regulations are enforced by the _____.

- (A) Corps of Engineers
- (B) U.S. Coast Guard
- (C) State Pollution Board
- (D) Port Authority

If choice B is selected set score to 1.

8. If you see an individual fall overboard, you should _____.

- (A) throw a life ring overboard
- (B) hail "Man Overboard"
- (C) pass the word to the bridge
- (D) all of the above

If choice D is selected set score to 1.

9. The external flotation bladder on an immersion suit should be inflated _____.

- (A) before you enter the water
- (B) after you enter the water
- (C) after one hour in the water
- (D) after you notice that your suit is losing buoyancy

If choice B is selected set score to 1.

10. Which of the listed classes of fire would most likely occur in the engine room of a vessel?

- (A) Classes "A" and "B"
- (B) Classes "B" and "C"
- (C) Classes "C" and "D"
- (D) Classes "A" and "D"

If choice B is selected set score to 1.

11. The vapors given off by heated fuel oil are flammable, explosive, and _____.

- (A) lighter than air
- (B) heavier than air
- (C) non-toxic
- (D) odorless

If choice B is selected set score to 1.

12. A compartment is tested and found to contain 20.8% oxygen by volume, permissible concentrations of toxic materials, and concentrations of flammable gas just below the lower flammable limit. If the residues are not capable of producing toxic materials or flammable concentrations, what would be the designation listed on the marine chemist's certificate?

- (A) Safe for men - Safe for Fire
- (B) Not safe for men - Not Safe for Fire
- (C) Safe for men - Not Safe for Fire
- (D) Not safe for men - Safe for Fire

If choice C is selected set score to 1.

13. Low velocity water fog is used in firefighting as a _____.

- (A) barrier against radiant heat
- (B) smothering agent
- (C) cooling agent
- (D) all of the above

If choice D is selected set score to 1.

14. When personnel are lifted by a helicopter from an inflatable life raft, the personnel on the raft should _____.

- (A) deflate the floor of the raft to reduce the danger of capsizing
- (B) inflate the floor of the raft to provide for additional stability
- (C) remove their life jackets to prepare for the transfer
- (D) take in the sea anchor to prevent fouling of the rescue sling

If choice A is selected set score to 1.

15. The most effective method of extinguishing a class "A" fire is by _____.

- (A) quenching and cooling
- (B) using non-conducting extinguishers
- (C) blanketing and smothering
- (D) using a sodium based dry chemical

If choice A is selected set score to 1.

16. When inspecting a survival craft, you should check to make sure that the _____.

- (A) sea anchor is deployed
- (B) hydraulic starting system has been drained
- (C) hydraulic pressure is within the specified range
- (D) steering controls are locked

If choice C is selected set score to 1.

17. If, in a compartment or space, the gas or oxygen content is not within permissible concentration, and dangerous gases are either present, or may be produced by residues, what would be the safety designation listed on a marine chemist's certificate?

- (A) Safe for Men - Safe for Fire
- (B) Safe for Men - Not Safe for Fire
- (C) Not Safe for Men - Safe for Fire
- (D) Not Safe for Men - Not Safe for Fire

If choice D is selected set score to 1.

18. When checking the level of a volatile liquid in a tank on the weather deck of a tank vessel, you should position yourself _____.

- (A) on the windward side of the opening
- (B) on the leeward side of the opening
- (C) at a right angle to the wind direction
- (D) so that the obstruction of your body will protect you from the fumes

If choice C is selected set score to 1.

19. Bunker "C" is classified as a grade _____.

- (A) "A" liquid
- (B) "B" liquid
- (C) "E" liquid
- (D) "D" liquid

If choice C is selected set score to 1.

20. The wooden plug fitted tightly in the vent of a damaged tank may prevent the tank from _____.

- (A) collapsing
- (B) developing free surface moments
- (C) developing free surfaces
- (D) filling completely

If choice D is selected set score to 1.

21. In a typical automatic fire alarm system, all zone circuits are always connected _____.

- (A) to the detecting cabinet
- (B) to the trouble alarm supervising resistor
- (C) in parallel
- (D) in series

If choice A is selected set score to 1.

22. If additional weight is placed on the main deck of the vessel shown in the illustration _____.
Illustration SF-0023

- (A) KB will go down
- (B) GM will increase
- (C) G will rise
- (D) K will rise

If choice C is selected set score to 1.

23. In heavy seas the helmsman should steer the survival craft _____.

- (A) into the seas
- (B) broadside to the seas
- (C) in the same direction as the seas
- (D) in a series of figure-eights

If choice A is selected set score to 1.

24. When fighting a shipboard fire, crew members securing doorways, hatches, and applying cooling water to adjacent decks and bulkheads, while monitoring the spread of heat and smoke, are setting a _____.

- (A) safety perimeter
- (B) cooling zone
- (C) fire boundary
- (D) buffer zone

If choice C is selected set score to 1.

25. When amendments are made to the shipboard oil pollution emergency plan, all revisions must be submitted to the Coast Guard _____.

- (A) six months prior to the end of the approval period
- (B) one month prior to the anniversary date of the plan
- (C) and can be implemented without immediate approval as long as final approval is received within six months of submittal
- (D) and cannot be implemented without approval

If choice D is selected set score to 1.

26. In the absence of external forces, adding weight to one side of a floating vessel will cause the vessel to _____.

- (A) decrease draft at the center of flotation
- (B) list until the center of buoyancy is aligned vertically with the center of gravity
- (C) heel until the angle of loll is reached
- (D) trim to the side opposite TCG until all moments are equal

If choice B is selected set score to 1.

27. By definition, an example of a flammable liquid is _____.

- (A) animal and vegetable oils
- (B) caustic potash
- (C) kerosene
- (D) gasoline

If choice D is selected set score to 1.

28. It is necessary to cool the bulkheads and decks surrounding a compartment where there is a fire in order to _____.

- (A) cool the metal below its ignition temperature
- (B) form a dense coating of smothering steam
- (C) prevent oxygen from reaching the flames
- (D) prevent the fire from spreading by the conduction of heat

If choice D is selected set score to 1.

29. In accordance with 33 CFR Subchapter O (Pollution), the overall responsibility in maintaining the Oil Record Book is given to the _____.

- (A) master
- (B) cargo engineer
- (C) chief engineer
- (D) chief mate

If choice A is selected set score to 1.

30. The fire extinguishing equipment shown in the illustration is a large _____. Illustration SF-0009

- (A) Halon 1301 hose reel system
- (B) CO₂ hose reel system
- (C) light water hose reel system
- (D) dry chemical hose reel system

If choice D is selected set score to 1.

31. The longer an oil fire is permitted to burn, the _____.

- (A) easier it is to extinguish
- (B) less chance there is of re-ignition
- (C) harder it is to extinguish
- (D) easier it is to control

If choice C is selected set score to 1.

32. Before entering any space that has been sealed, its oxygen level should be tested. What level of oxygen in the space is equal to fresh air?

- (A) 10.0%
- (B) 15.8%
- (C) 20.8%
- (D) 25.8%

If choice C is selected set score to 1.

33. Manufacturers of self-contained breathing apparatus use color-coded face pieces to indicate different sizes. Which of the following statements is true concerning the colors of SCBA face pieces?

- (A) Size "Small" is green.
- (B) Size "Large" (standard) is black.
- (C) Size "Extra Large" is red.
- (D) All of the above.

If choice D is selected set score to 1.

34. Which of the gases listed is the poisonous gas most likely to be found in a closed compartment involved in a fire?

- (A) Nitrogen
- (B) Hydrogen
- (C) Carbon dioxide
- (D) Carbon monoxide

If choice D is selected set score to 1.

35. The angular movement of a vessel about a horizontal line drawn from its bow to its stern is _____.

- (A) heaving
- (B) pitching
- (C) swaying
- (D) rolling

If choice D is selected set score to 1.

36. The best means of combating an oil fire on the surface of the water surrounding a vessel tied to the pier is to use _____.

- (A) foam directed against the vessel's side
- (B) dry chemical around the fire
- (C) water fog over the fire
- (D) solid water streams directly into the fire

If choice A is selected set score to 1.

37. You are involved in an emergency landing of a helicopter on the water. You should inflate your life jacket _____.

- (A) upon entering the helicopter
- (B) prior to reaching the water
- (C) after reaching the water, but prior to exiting the helicopter
- (D) after exiting clear of the helicopter

If choice D is selected set score to 1.

38. In a cartridge-operated dry chemical type fire extinguisher, when the CO₂ cartridge is activated, the dry chemical is released from the extinguisher _____.

- (A) with the squeeze-grip on/off nozzle at the end of the hose
- (B) with the squeeze-grip trigger on top of the container
- (C) by squeezing the control valve carrying handle
- (D) by turning the activating handle on the bottom of the container

If choice A is selected set score to 1.

39. Recharging a previously used cartridge-operated dry chemical fire extinguisher is accomplished by _____.

- (A) replacing the propellant cartridge and refilling it with powder
- (B) authorized fire equipment servicing personnel only
- (C) recharging the cartridge and refilling it with powder
- (D) puncturing the cartridge seal after installation

If choice A is selected set score to 1.

40. A high velocity fog nozzle will produce the most effective spray pattern when the water pressure is not less than _____.

- (A) 35 psi (241.3 kPa)
- (B) 60 psi (413.6 kPa)
- (C) 75 psi (517.0 kPa)
- (D) 100 psi (689.4 kPa)

If choice D is selected set score to 1.

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

- (A) at a point that is one-third from the bottom of the bulkhead
- (B) at the vertical center of the bulkhead
- (C) along the top of the bulkhead
- (D) along the bottom of any bulkhead

If choice D is selected set score to 1.

42. After measuring the length to which a section of shoring should be cut, you should cut the shoring _____.

- (A) approximately 1/2 inch shorter per foot of the measured length to allow for wet expansion
- (B) approximately 1/2 inch shorter than the measured length to allow for the use of wedges
- (C) approximately 1/2 inch longer than the measured length to allow for trimming
- (D) to the same length as the measured length

If choice B is selected set score to 1.

43. Paints and solvents used aboard a vessel should be _____.

- (A) drained into a common container after each use
- (B) returned to the paint locker after each use
- (C) stowed safely at the work site until work is completed
- (D) covered with a fine mesh screen to protect from ignition sources

If choice B is selected set score to 1.

44. A class "D" fire would involve the burning of _____.

- (A) diesel oil
- (B) dunnage
- (C) electrical insulation
- (D) magnesium

If choice D is selected set score to 1.

45. The highest concentration of a harmful substance to which a person may be exposed without danger to health, is termed the _____.

- (A) vapor pressure
- (B) tolerance point
- (C) threshold limit value
- (D) odor threshold

If choice C is selected set score to 1.

46. A specific document which identifies a chemical, and lists its physical properties, health hazards, required controls, firefighting procedures, cleanup methods, waste disposal, and the safe handling and storage requirements, is commonly called a _____.

- (A) Physical/Chemical Characteristics Document
- (B) Hazardous Chemical Information Sheet
- (C) Material Safety Data Sheet
- (D) Hazardous Chemical Loading Document

If choice C is selected set score to 1.

47. In the event of a fire, the doors to a stair tower must be closed to prevent the spread of fire by _____.

- (A) convection
- (B) conduction
- (C) radiation
- (D) ventilation

If choice A is selected set score to 1.

48. The advantage of using a dry chemical fire extinguishing agent is _____.

- (A) its good stability and non-toxicity
- (B) its excellent cooling ability
- (C) permanent extinguishment regardless of the re-ignition sources
- (D) all of the above

If choice A is selected set score to 1.

49. When compared to other fire extinguishing agents, water fog _____.

- (A) has the greatest ability to produce foam
- (B) has the greatest cooling ability
- (C) will completely remove toxic fumes from the air
- (D) will completely remove combustible vapors from the air

If choice B is selected set score to 1.

50. To prevent oily rags from spontaneously igniting they should be _____.

- (A) kept in the paint locker
- (B) kept in nonmetal containers
- (C) cleaned thoroughly for reuse
- (D) discarded as soon as possible

If choice D is selected set score to 1.

51. If a fire occurs in an electric cable, in which the inner layers of insulation, or the insulation covered by armor is burning, you should _____.

- (A) secure power to the cable
- (B) cut the cable with an insulated cable cutter
- (C) separate the two ends
- (D) all of the above

If choice D is selected set score to 1.

52. When pumping sour crude, which gas should be tested for prior to entering the cargo pump room to repair a leaking pump?

- (A) Benzene
- (B) Carbon monoxide
- (C) Hydrogen sulfide
- (D) Tetraethyl lead

If choice C is selected set score to 1.

53. In the event of an exhaust duct fire, most dry chemical and carbon dioxide galley range fixed extinguishing systems are automatically activated through the action of a stainless steel cable, spring and a _____.

- (A) fusible link
- (B) stack switch
- (C) thermostat
- (D) pyrostat

If choice A is selected set score to 1.

54. Reserve buoyancy is the _____.

- (A) unoccupied space below the waterline
- (B) volume of intact space above the waterline
- (C) difference between buoyancy in salt and fresh waters
- (D) excess of the buoyant force over gravitational force

If choice B is selected set score to 1.

- 55.** On a cargo ship equipped with a combination fire detection/carbon dioxide extinguishing system, the presence of fire is indicated at the cabinet simultaneously in two spaces: No.3 hold upper between decks, containing bagged coffee beans; and No.4 lower hold containing fertilizer. To combat these fires you should _____.
- (A) activate the pilot CO₂ cylinders, directing the discharge to No.3 hold, then to No.4 hold through the three-way valve
 - (B) open the applicable three-way valve for No.3 hold and fight the fire in No.4 hold with water
 - (C) open the applicable three-way valve for No.4 hold. After discharge, secure the valve; then open the applicable valve for No.3 hold
 - (D) open the three-way valves to each space simultaneously

If choice C is selected set score to 1.

- 56.** The water in which a vessel floats provides vertical upward support. The point through which this support is assumed to act is known as the center of _____.
- (A) effort
 - (B) buoyancy
 - (C) gravity
 - (D) flotation

If choice B is selected set score to 1.

- 57.** Which of the following components provides a direct source of sea water for the fire main system?
- (A) Sea chest suction
 - (B) Cofferdam sluice valve
 - (C) Rose box suction
 - (D) Fire pump stuffing box

If choice A is selected set score to 1.

- 58.** An oxygen indicator will detect _____.
- (A) the presence of harmful amounts of carbon monoxide
 - (B) concentrations of explosive gas
 - (C) an oxygen deficiency in a space
 - (D) all of the above

If choice C is selected set score to 1.

59. When required to work in an area where explosive gases may accumulate, you should use hand tools which are _____.

- (A) high carbon steel
- (B) approved by the Coast Guard
- (C) fixed with a ferrous cover
- (D) non-ferrous

If choice D is selected set score to 1.

60. In the illustration shown, the sea painter is identified as item number _____. Illustration SF-0043

- (A) 3
- (B) 6
- (C) 7
- (D) 9

If choice C is selected set score to 1.

61. 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 10" x 8" x 12" duplex double acting reciprocating bilge pump, operating at 96% efficiency, to keep the bilge water level from continuing to rise? Illustration SF-0034

- (A) 45 strokes per minute
- (B) 56 strokes per minute
- (C) 87 strokes per minute
- (D) 98 strokes per minute

If choice C is selected set score to 1.

62. Which of the following limitations is correct regarding gas or filter masks?

- (A) A maximum of only 30 minutes of protection is afforded with a single canister when in atmospheres containing highly toxic gases.
- (B) All canisters must be discarded within 24 hours when the seal becomes broken.
- (C) A canister is reliable for up to 5 years from the date of manufacture, as long as the seal is unbroken.
- (D) All of the above.

If choice C is selected set score to 1.

63. Good housekeeping on a vessel prevents fires by _____.

- (A) allowing better access in an emergency
- (B) eliminating potential fuel sources
- (C) eliminating trip hazards
- (D) improving personnel qualifications

If choice B is selected set score to 1.

64. A fire that has developed in a pile of rubber gasket material would be classified as a _____.

- (A) class "A"
- (B) class "B"
- (C) class "C"
- (D) class "D"

If choice A is selected set score to 1.

65. If deck cargo is carried, it should be stowed so that it _____.

- (A) will cover less than 25 percent of deck space
- (B) does not block access to the fire station hydrant
- (C) will be easily visible from the bridge
- (D) is not higher than 12 inches above the deck

If choice B is selected set score to 1.

66. If there has been a fire in a closed unventilated compartment it may be unsafe to enter because of _____.

- (A) excess hydrogen
- (B) unburned carbon particles
- (C) excess nitrogen
- (D) a lack of oxygen

If choice D is selected set score to 1.

67. Victual waste is _____.

- (A) the final waste product of a manufacturing process
- (B) the resultant sludge that is collected after water washing a boiler
- (C) the final discharge of sewage treatment plants
- (D) any garbage that comes from food or food provisions

If choice D is selected set score to 1.

68. If flammable vapors have penetrated a gas free space, which of the following actions would be the most hazardous to perform?

- (A) Opening switches in the space to de-energize circuits.
- (B) Closing switches adjacent to the space to operate vent fans.
- (C) Leaving electrical circuits energized in the space.
- (D) Securing all power to the space from a remote location.

If choice A is selected set score to 1.

69. A fire can be extinguished by removing _____.

- (A) the fuel
- (B) the heat
- (C) the oxygen
- (D) any of the above

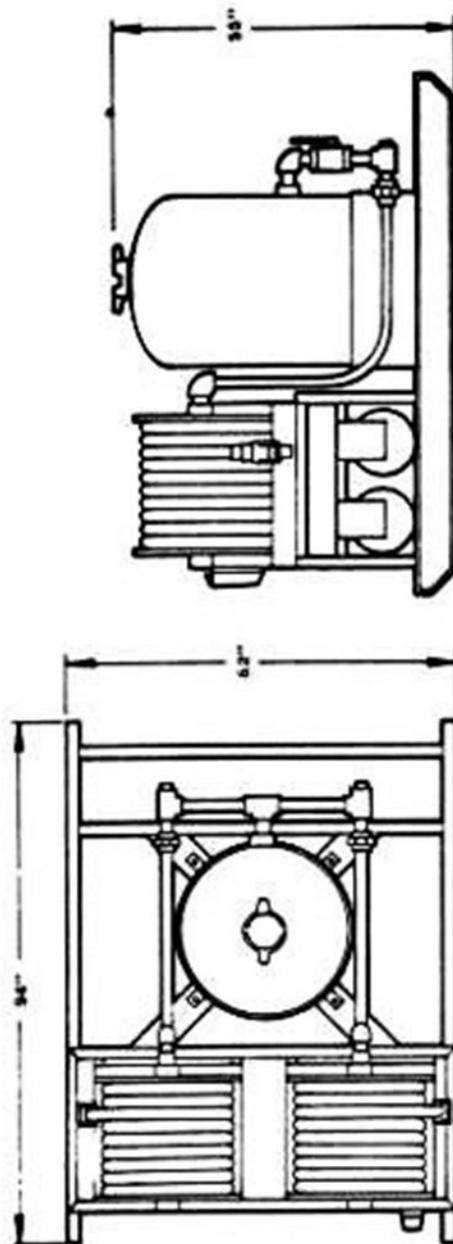
If choice D is selected set score to 1.

70. In cleaning up an oil spill, the use of straw or reclaimed paper fibers would be an example of which type of oil removal?

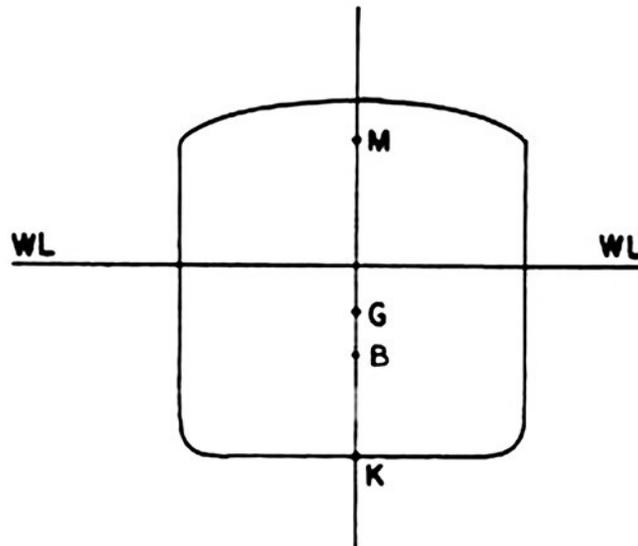
- (A) Mechanical removal
- (B) Chemical agent removal
- (C) Absorbent removal
- (D) None of the above

If choice C is selected set score to 1.

SF-0009



SF-0023



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SF-0034

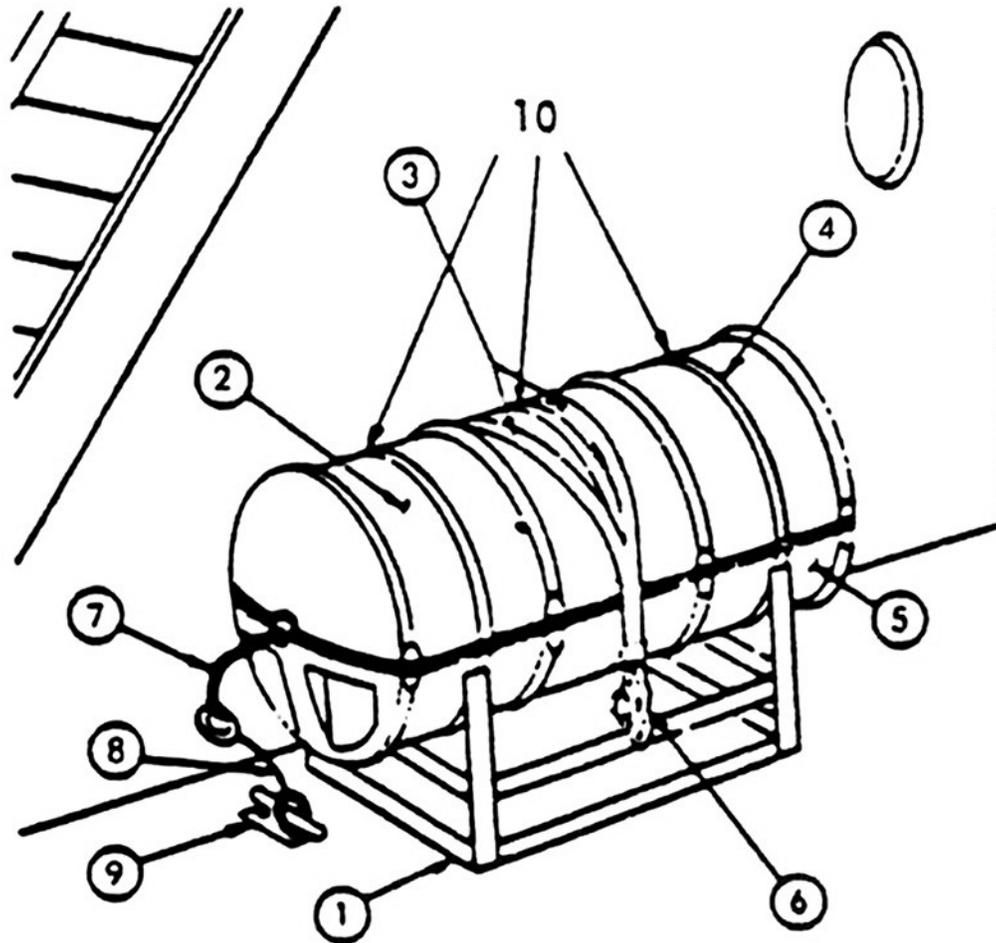
Flow of Water Through Holes (Gallons per Minute)

HOLE DIA. IN INCHES	HEAD OF WATER IN FEET												
	2	4	6	8	10	12	14	16	18	20	24	28	32
1	28	40	49	56	63	69	74	79	84	89	97	105	112
2	111	157	192	222	248	272	294	314	333	351	384	415	444
3	250	354	433	500	559	612	661	707	750	790	866	935	1000
4	445	629	770	889	994	1089	1176	1257	1333	1405	1540	1663	1778
5	695	982	1203	1389	1553	1701	1837	1964	2083	2196	2406	2598	2778
6	1000	1414	1732	2000	2236	2449	2646	2828	3000	3162	3464	3741	4000
7	1361	1925	2357	2722	3043	3333	3601	3849	4083	4303	4714	5092	5444
8	1777	2514	3078	3555	3974	4354	4702	5027	5332	5620	6157	6650	7109
9	2249	3181	3896	4499	5030	5510	5951	6362	6748	7113	7792	8416	8997
10	2777	3927	4809	5553	6209	6802	7347	7854	8330	8781	9619	10390	11107
11	3360	4752	5820	6720	7514	8231	8890	9504	10080	10626	11640	12573	13441
12	4000	5655	6926	7997	8941	9795	10579	11310	11996	12645	13852	14961	15995
13	4693	6637	8129	9386	10494	11496	12417	13274	14079	14841	16257	17560	18772
14	5443	7697	9426	10885	12170	13331	14400	15394	16327	17210	18853	20364	21770
15	6246	8834	10820	12494	13969	15302	16528	17667	18740	19754	21640	23374	24988
16	7106	10051	12310	14214	15892	17409	18804	20102	21322	22475	24620	26593	28429
17	8024	11347	13897	16047	17942	19654	21229	22694	24071	25373	27795	30022	32095
18	8996	12722	15582	17992	20116	22035	23802	25445	26988	28448	31164	33660	35985
19	10024	14177	17363	20049	22416	24555	26523	28354	30073	31700	34726	37408	40098
20	11110	15710	19241	22218	24840	27211	29392	31421	33326	35129	38483	41566	44436
21	12244	17316	21208	24488	27379	29992	32396	34632	36732	38719	42416	45814	48977
22	13439	19008	23280	26881	30054	32923	35561	38016	40322	42503	46560	50290	53763
23	14688	20772	25441	29376	32844	35978	38861	41544	44064	46447	50881	54958	58753
24	15995	22622	27707	31993	35769	39183	42323	45245	47989	50585	55414	59853	63986
25	17356	24545	30061	34711	38809	42513	45920	49090	52067	54883	60122	64939	69424
26	18770	26546	32513	37542	41974	45980	49664	53093	56313	59359	65025	70235	75085
27	20242	28627	35061	40485	45264	49584	53557	57254	60727	64012	70122	75740	80971
28	21770	30787	37707	43539	48679	53325	57598	61574	65309	68842	75413	81455	87080
29	23353	33026	40449	46706	52220	57203	61787	66053	70059	73849	80898	87380	93414
30	24992	35345	43289	49985	55885	61219	66125	70690	74977	79033	86577	93514	99971
31	26683	37735	46216	53365	59665	65359	70597	75470	80048	84378	92432	99838	106732
32	28434	40212	49250	56868	63581	69649	75231	80424	85302	89916	98499	106391	113738

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