U.S.C.G. Merchant Marine Exam

MODU – Chief Engineer

Q740 Engineering Safety & Environmental Protection

(Sample Examination)

Choose the best answer to the following Multiple-Choice Questions:

1. What is a major advantage of using a positive pressure type self-contained breathing apparatus?

   A. Facial hair will not affect the mask performance.
   B. The equipment is lightweight, and the wearer can work without difficulty in confined spaces.
   C. The average operating time is over an hour.
   D. The speed with which it can be put into operation is around 45 seconds.

   Correct Answer: D

2. Which of the following statements is TRUE concerning life jackets?

   A. Buoyant vests may be substituted for life jackets.
   B. Life jackets are designed to turn an unconscious person's face clear of the water.
   C. Life jackets must always be worn with the same side facing outwards to float properly.
   D. Lightly stained or faded life jackets will fail in the water and should not be used.

   Correct Answer: B

3. A rigid lifesaving device designed for a group of survivors to hold on to while in the water is defined as a _____.

   A. life raft
   B. life cushion
   C. life preserver
   D. buoyant apparatus

   Correct Answer: D

4. 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

   Correct Answer: B

5. Sea water may be used for drinking water _____.

   A. at a maximum rate of two ounces per day
   B. after mixing with an equal quantity of fresh water
   C. if gathered during or immediately after a hard rain
   D. under no circumstance

   Correct Answer: D

6. An "on-load" release system on a survival craft means the cable can be released _____.

   A. only when the load is taken off the cable
   B. only when there is a load on the cable
   C. only when activated by the controls at the lowering station
   D. at any time

   Correct Answer: D

7. You have abandoned ship and are in charge of a life raft. How much water per day should you permit each occupant to drink after the first 24 hours?

   A. 1 can
   B. 1 pint
   C. 1 quart
   D. 1 gallon

   Correct Answer: B

8. Why is an upper limit switch used when raising the lifeboat?

   A. To assist in cranking in the lifeboat
   B. To keep the tricing lines from releasing or getting tangled
   C. To prevent the davits from pulling up against the stops
   D. To stop the lifeboat from being lowered

   Correct Answer: C

9. 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

   Correct Answer: D

10. A tank has been sealed and unventilated for a long period of time. Which of the following statements is true?

    A. The tank is safe to enter.
    B. The tank is especially dangerous to enter.
    C. Carbon monoxide is present.
    D. Water vapor present when the tank was sealed has oxidized.

    Correct Answer: B

11. Except in rare cases, it is impossible to extinguish a shipboard fire by _____.

    A. removing the fuel
    B. removing the heat
    C. interrupting the chain reaction
    D. removing the oxygen

    Correct Answer: A

12. A Type B fire has been reported onboard your vessel. What type of materials would your fire teams expect to find at the scene?

    A. Flammable liquids, greases, etc., where a blanketing effect is essential
    B. Metals
    C. Electrical equipment where the use of nonconducting extinguishing agent is of first importance
    D. Ordinary combustible materials where the quenching and cooling effects of quantities of water, or solutions containing large percentages of water, are of first importance

    Correct Answer: A

13. A Type A fire has been reported onboard your vessel. What type of materials would your fire teams expect to find at the scene?

    A. Flammable liquids, greases, etc., where a blanketing effect is essential
    B. Metals
    C. Ordinary combustible materials where the quenching and cooling effects of quantities of water, or solutions containing large percentages of water, are of first importance
    D. Electrical equipment where the use of a non-conducting extinguishing agent is of first importance

    Correct Answer: C

14. A fire involving aluminum powder would be a class _____.

    A. "A" fire
    B. "B" fire
    C. "C" fire
    D. "D" fire

    Correct Answer: D

15. 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

    Correct Answer: D

16. To prevent the spread of fire by convection you should _____.

    A. cool the bulkhead around the fire
    B. close all openings to the area
    C. shut off electrical power
    D. remove combustibles from direct exposure

    Correct Answer: B

17. A simple precaution to reduce the possibility of accidental fires in the paint locker, is to _____.

    A. label the fixed firefighting system
    B. store paint cans on metal shelves only
    C. not allow oily rags to accumulate in the space
    D. place a portable fire extinguisher immediately outside the locker

    Correct Answer: C

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

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

    Correct Answer: C

19. How would you ensure that your crew is prepared to combat a shipboard fire using ship's equipment?

    A. Check training records, to see if crew members have attended a firefighting training course.
    B. Conduct required drills, simulating fire conditions and training with ship's equipment.
    C. Show crew generic fire training videos.
    D. Have them read a firefighting textbook.

    Correct Answer: B

20. As chief engineer, you are discussing with a new third engineer the methods of fighting an engine room fire. You ask the junior engineer to explain how to proceed in the event of an engine room fire when you cannot gain entry to the control room. Which of the following should be included in the junior engineer's response?

    A. Secure the ventilation and allow the fire to burn itself out.
    B. Secure the fuel pumps and ventilation from the emergency station outside the engine room.
    C. Open the steam smothering to the main engine.
    D. Immediately dump the fixed CO2 system without securing the ventilation.

    Correct Answer: B

21. Fire detecting systems on merchant vessels may be arranged to sense _____.

    A. ionized particles
    B. rate of temperature rise
    C. smoke
    D. all of the above

    Correct Answer: D

22. The most common cooling agent used for fighting fires on tank vessels is _____.

    A. carbon dioxide
    B. steam smothering
    C. flue gas
    D. water

    Correct Answer: D

23. The principle personnel hazard unique to Halon fire extinguishers is _____.

    A. inhaling toxic vapors produced when exposed directly to a flame for extended periods
    B. eye irritation produced immediately after discharge from cylinder
    C. skin irritation
    D. displacement of oxygen

    Correct Answer: A

24. 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

    Correct Answer: C

25. To activate a foam type portable fire extinguisher, you must _____.

    A. strike the bottom of the extinguisher against the deck
    B. turn the extinguisher upside down
    C. pump the hand lever for pressure
    D. pull the pin and squeeze the grips

    Correct Answer: B

26. If a fire broke out in an automation console, you would first secure the power and then proceed to use which of the listed hand portable fire extinguishers?

    A. Foam
    B. Dry chemical
    C. Soda acid
    D. CO2

    Correct Answer: D

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

    A. light water hose reel system
    B. CO2 hose reel system
    C. dry chemical hose reel system
    D. Halon 1301 hose reel system

    Correct Answer: C

28. If a fire hose is left unattended and under pressure with the nozzle shut off, the fire hose will _____.

    A. burst under pressure
    B. lash about violently
    C. become elongated by 125%
    D. remain motionless

    Correct Answer: D

29. Water applied as a "fog" can be more effective than water applied as a "solid stream", because _____.

    A. a given amount of water can absorb more heat when it is in the form of fog
    B. it reduces the total amount of water that must be pumped into the ship to fight a given fire
    C. it does not have to hit the seat of fire to be effective
    D. of all of the above

    Correct Answer: D

30. Why is it essential to introduce CO2 from a fixed fire extinguishing system, into a large engine room, as quickly as possible?

    A. Carbon dioxide takes a long time to disperse to all portions of a space
    B. Updraft from the fire tends to carry the CO2 away
    C. The fire may warp the CO2 piping
    D. To keep the fire from spreading through the bulkheads

    Correct Answer: B

31. During vessel familiarization, you find the vessel you are newly assigned to as chief engineer has a high-pressure CO2 system for the engine room. In what way are the high-pressure CO2 bottles released in the event of an engine room fire?

    A. The smoke detection system automatically releases CO2 to the engine room.
    B. The bottles are released individually.
    C. The master cylinder sends gas to the actuators on all bottles in the affected banks.
    D. The pull wire releases all bottles in the banks.

    Correct Answer: C

32. While in the engine control room you smell smoke and see it coming from the vent in the main switchboard panel. Which of the many different types of extinguishers, if any, are required to be in that space and why would it be best suited to extinguish this class of fire?

    A. A fixed CO2 system as it will smother the fire while limiting the clean-up and damage to the area around the fire.
    B. A portable dry chemical extinguisher, as it is the most common type of portable extinguisher found onboard ships.
    C. A portable CO2 extinguisher as it will smother the fire while limiting the clean-up and damage to the area around the fire.
    D. No portable extinguisher is required in the engine control room.

    Correct Answer: C

33. As the senior engineer of a vessel, you have just activated the CO2 release handle for the engine room to extinguish a fire. How would you direct the emergency team to re-enter the engine room?

    A. Wait until there are no signs of smoke or heat, have the team dressed in firefighting gear and approach the engine room door. Crack the door open and advance, if no fire is detected.
    B. Wait until there are no signs of smoke or heat, then, with the team dressed in firefighting gear and SCBA, approach the engine room door. Crack the door open with a charged fire hose at the ready and advance, if no fire is detected.
    C. Have the team wait two hours, then, with the team dressed in firefighting gear and SCBA, approach the engine room door. Crack the door open and advance, if no fire is detected.
    D. Have the team wait two hours and crack the door open with a charged fire hose at the ready and advance, if no fire is detected.

    Correct Answer: B

34. 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

    Correct Answer: D

35. One of the main concerns when fighting a galley fire is _____.

    A. the loss of stability
    B. the igniting of a grease fire in the range hood ventilation system
    C. spreading of fire through the engineering space
    D. contaminating food with extinguishing agent

    Correct Answer: B

36. You notice smoke coming from an open laundry room doorway, which smells like electrical insulation. After activating the fire alarm, which of the following would be the lowest action priority?

    A. Close the door to the room
    B. Locate the nearest CO2 or dry chemical extinguisher
    C. Secure power to the washers and dryers
    D. Break out the nearest fire hose

    Correct Answer: D

37. As the senior engineer onboard a vessel, how would you instruct a new engineer to use the firefighting apparatus illustrated to fight an oil fire at the bunker station? Illustration SF-0020

    A. Direct aqueous film forming foam off the overhead or nearby bulkhead, using a bank down or bounce off method to extinguish the fire.
    B. Direct aqueous film forming foam in a straight stream into the fuel to extinguish the fire.
    C. This piece of firefighting equipment cannot be used to extinguish an oil fire.
    D. Direct water off the overhead or nearby bulkhead, using a bank down or bounce off method to extinguish the fire.

    Correct Answer: A

38. In fighting a fire in a fuel tank, the FIRST action you should attempt is to _____.

    A. begin transferring the fuel to other tanks
    B. secure all sources of fresh air to the tank
    C. top off the tank to force out all vapors
    D. station someone at the fixed CO2 release controls

    Correct Answer: B

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

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

    Correct Answer: C

40. When making entries in the Oil Record Book, all quantities should be _____.

    A. consistently recorded through the Oil Record Book in one specified unit (gallons, barrels, cubic meters)
    B. recorded as cubic meters with a conversion to barrels
    C. recorded directly from the oil discharge monitor
    D. verified by the chief engineer

    Correct Answer: A

41. Which ship must maintain Part II (Cargo/Ballast Operations) of the Oil Record Book?

    A. A non-tanker that carries more than 200 cubic meters of oil in bulk
    B. A ship of 200 gross tons or above, other than an oil tanker
    C. A ship of 150 gross tons or above, other than an oil tanker
    D. An oil tanker of 100 gross tons or above

    Correct Answer: A

42. Coast Guard regulations require a shipboard oil pollution emergency plan to be reviewed _____.

    A. once a year
    B. once every two years
    C. once every four years
    D. once every five years

    Correct Answer: A

43. The most common type of containment device for spilled oil on the water is the use of _____.

    A. straw
    B. chemical dispersants
    C. booms
    D. skimmers

    Correct Answer: C

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

    A. reduce the fuel oil pumping rate
    B. close the static leg filling valve
    C. stop the fuel oil pumping operation
    D. close the overflow tank filling valve

    Correct Answer: C

45. Which of the following methods will reduce the possibility of producing an electrical spark?

    A. Placing an insulating flange or a section of non-conducting hose in the hose setup
    B. Connecting a bonding wire between the shoreside piping and the vessel
    C. Using a cargo hose with a built-in electrical bonding wire
    D. All of the above

    Correct Answer: D

46. Victual waste is _____.

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

    Correct Answer: A

47. You are providing onboard training to your engineers on the factors affecting trim and stability. What instructions do you give your engineers to stabilize the ship should it experience an unstable rolling behavior?

    A. Add ballast to wing tank to the side of the ship with an angle of list.
    B. Add ballast to a centerline double bottom tank.
    C. Discharge water from the forepeak tank.
    D. Discharge dirty ballast from a centerline double bottom tank.

    Correct Answer: B

48. As chief engineer you should understand the fundamental principles of ship construction and theory and factors affecting trim and stability, including the concept of loll and its cause. An angle of loll is commonly caused by which of the following conditions?

    A. A negative GM
    B. An off-center weight
    C. Free surface with G remaining below M
    D. High external force such as wind and current

    Correct Answer: A

49. With no environmental forces acting on the vessel, the center of gravity of an inclined vessel is vertically aligned with the _____.

    A. metacenter
    B. center of flotation
    C. original vertical centerline
    D. longitudinal centerline

    Correct Answer: C

50. Your vessel has been damaged in a grounding and one compartment has partially flooded. As a result, you have lost buoyancy. If transverse stability in the flooded condition is poor or negative, every effort should be made to reduce the free surface and to lower the center of gravity. Which of the following should you ensure is maintained?

    A. A GM that is at least neutral - G moved down to be at M
    B. Ballast is maintained in the pre-grounding state
    C. A no list condition
    D. As much reserve buoyancy as possible

    Correct Answer: D

51. Your vessel, of more than 1000 gross tons on an international voyage is crossing the Atlantic Ocean. The second engineer injures his hand while working on a pump. The injury requires more than basic first aid. As the senior officer onboard how would you proceed?

    A. Contact the medical advisory service contracted by your company to speak with a shoreside doctor and address the injury as directed by the doctor.
    B. Call your company port engineer and ask for help.
    C. Seek help from fellow crew members who have no medical training.
    D. Read an outdated copy of the Ships Medicine Chest reference book found onboard to help treat the injury.

    Correct Answer: A

52. The airborne concentrations of substances (such as hydrogen sulfide) under which nearly all workers may be repeatedly exposed without adverse effects are called _____.

    A. exposure limits
    B. concentration limits
    C. threshold limit values
    D. substance limit values

    Correct Answer: C

53. As first engineer, you are standing by the #3 deep fuel oil storage tank as a crew member is working inside the tank. Before entering the tank, the atmosphere was checked and determined safe for men to work. While standing by you notice that the crew member is not moving. After attempts to communicate with the downed mariner receives no response, what action would you take?

    A. Send two additional crew members, without a SCBA on, into the tank to retrieve the unconscious crew member.
    B. Send another crew member, without a SCBA on, into the tank to retrieve the unconscious crew member.
    C. Call the captain and ask him how you should proceed.
    D. Have additional crew members don a SCBA to enter the tank, to aid in the removal of the unconscious crew member.

    Correct Answer: D

54. The instrument shown in the illustration has not been used for several weeks. Prior to its use for testing a compartment, you should _____. Illustration SF-0003

    A. purge the meter
    B. check or renew the batteries
    C. adjust the meter pointer to zero
    D. all of the above

    Correct Answer: D

55. An oxygen indicator will detect _____.

    A. an oxygen deficiency in a space
    B. the presence of harmful amounts of carbon monoxide
    C. concentrations of explosive gas
    D. all of the above

    Correct Answer: A

56. According to the Pollution Prevention Regulations The explosive range of a mixture of flammable vapors and air lies between the lower and upper explosive limits. These limits are specified as a percentage of _____.

    A. the temperature of the flash point
    B. flammable vapor by volume in air
    C. oxygen present to support combustion
    D. the lower limit of explosibility of the mixture

    Correct Answer: B

57. (3.6.11.1-11) The explosive range of a mixture of flammable vapors and air lies between the lower and upper explosive limits. These limits are specified as a percentage of _____.

    A. the temperature of the flash point
    B. flammable vapor by volume in air
    C. oxygen present to support combustion
    D. the lower limit of explosibility of the mixture

    Correct answer: B

58. The volatility of a liquid is the tendency of a liquid to _____.

    A. vaporize
    B. ignite
    C. asphyxiate
    D. explode

    Correct Answer: A

59. If diesel fuel vapors in a compartment are considered to be within the flammable range _____.

    A. an explosion may occur if a source of ignition is present
    B. the vapor air mixture is too lean to burn
    C. the vapor air mixture is too rich to burn
    D. the upper explosive limit has been exceeded

    Correct Answer: A

60. When preparing to pump flammable liquids with a centrifugal pump, you should _____.

    A. draw a small quantity of liquid to prime the pump
    B. lift the relief valve by hand to check its operation
    C. have a standby pump running with the discharge valve closed
    D. check for gland leakage and any fire hazard

    Correct Answer: D

61. Which of the following methods will reduce the possibility of producing an electrical spark?

    A. Placing an insulating flange or a section of non-conducting hose in the hose setup
    B. Connecting a bonding wire between the shoreside piping and the vessel
    C. Using a cargo hose with a built-in electrical bonding wire
    D. All of the above

    Correct Answer: D

62. Span gas is used aboard liquefied natural gas carriers to _____.

    A. inert the barrier spaces
    B. detect leaks in cargo piping
    C. calibrate the gas leak detectors
    D. odorize the cargo

    Correct Answer: C

63. Which of the following precautions are necessary when using any electrical equipment in a hazardous location, such as a cargo pumproom?

    A. The pumproom is to be gas free
    B. Each compartment where flammable gas is expected to accumulate is to be closed and secured
    C. The adjacent compartments are to be gas free
    D. All of the above

    Correct Answer: D

64. The physical data term on a Safety Data Sheet (SDS) that indicates if the vapor formed by a material is lighter or heavier than air is called _____.

    A. vapor gravity
    B. vapor density
    C. vapor level
    D. vapor pressure

    Correct Answer: B

65. What term is listed on a Safety Data Sheet (SDS) to describe a chemical that can produce life-threatening or seriously disabling health hazards?

    A. High toxicity
    B. Low toxicity
    C. Recommended toxicity
    D. Moderate toxicity

    Correct Answer: A

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

    A. collapsing
    B. filling completely
    C. developing free surfaces
    D. developing free surface moments

    Correct Answer: B

67. Your vessel has just been struck by another vessel. After meeting with the captain and chief mate, you have immediately ordered the vessel specific damage control procedures in the vessel's approved stability booklet to be enacted. Which of the following statements is true?

    A. The universal station billet assigning crew member responsibilities will provide adequate reference information to determine the adequate damage control response.
    B. The Safety Management System will provide an IMO standard response for all collision response procedures, including damage control.
    C. The Certificate of Documentation issued to the vessel will be the primary reference document in order to calculate free surface corrections.
    D. The vessel general arrangement plan would be a critical reference document for your response providing accurate data showing watertight compartments, closures, vents and downflooding angles.

    Correct Answer: D

68. Wooden shoring, with a cross-sectional dimension of 4" X 4" should not be longer than _____.

    A. 8 feet
    B. 10 feet
    C. 16 feet
    D. 20 feet

    Correct Answer: B

69. Following a grounding, you can best determine that a SLACK fuel oil tank has been holed by _____.

    A. checking fuel oil strainers
    B. waiting for the vessel to list
    C. sounding the tank
    D. examining tank boundaries

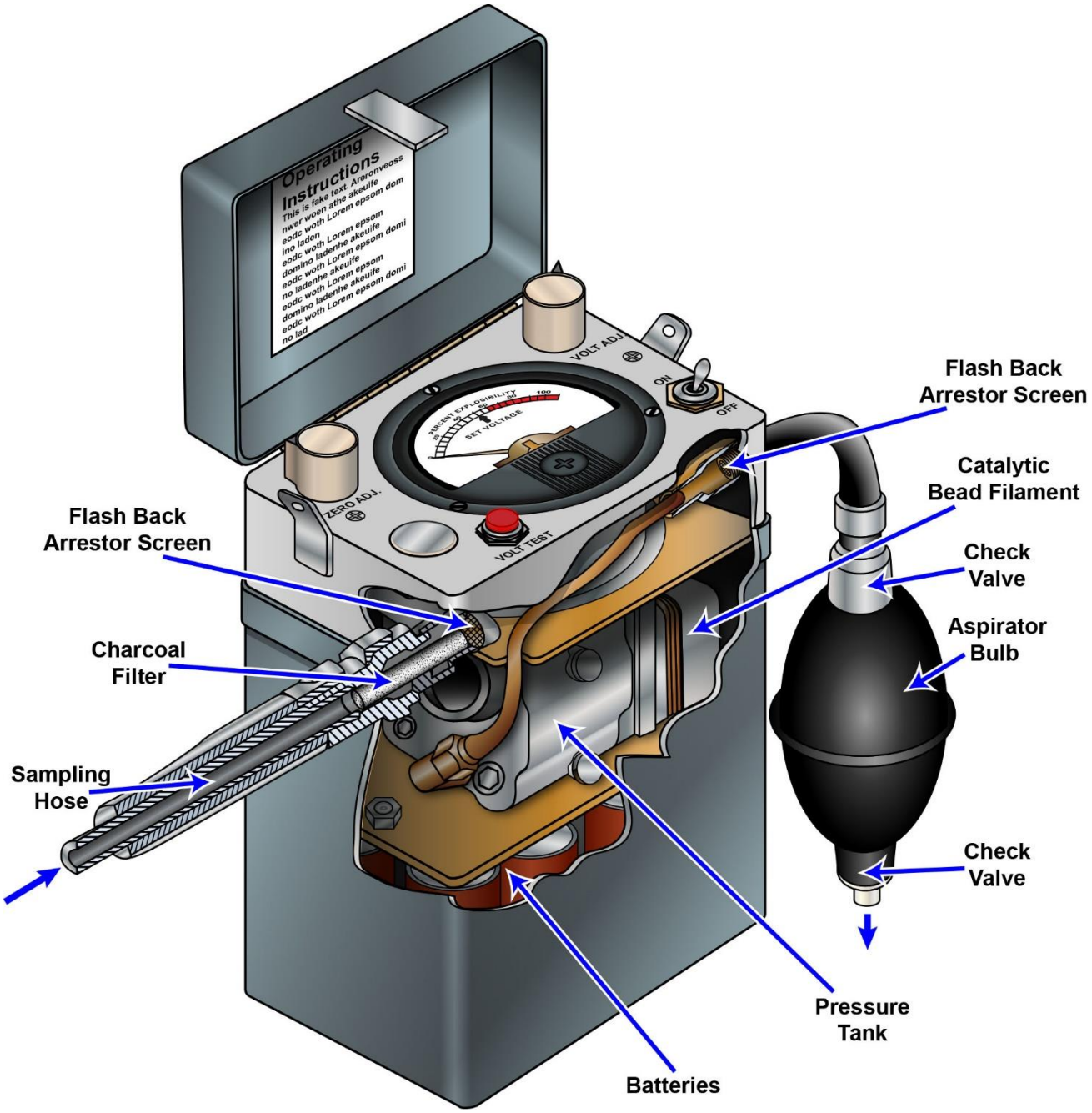
    Correct Answer: C

70. Progressive flooding in the engine room may be minimized by securing watertight boundaries and _____.

    A. evacuating the engine room
    B. pumping out flooded compartments
    C. dumping fuel oil
    D. transferring reserve feedwater

    Correct Answer: B

SF-0003



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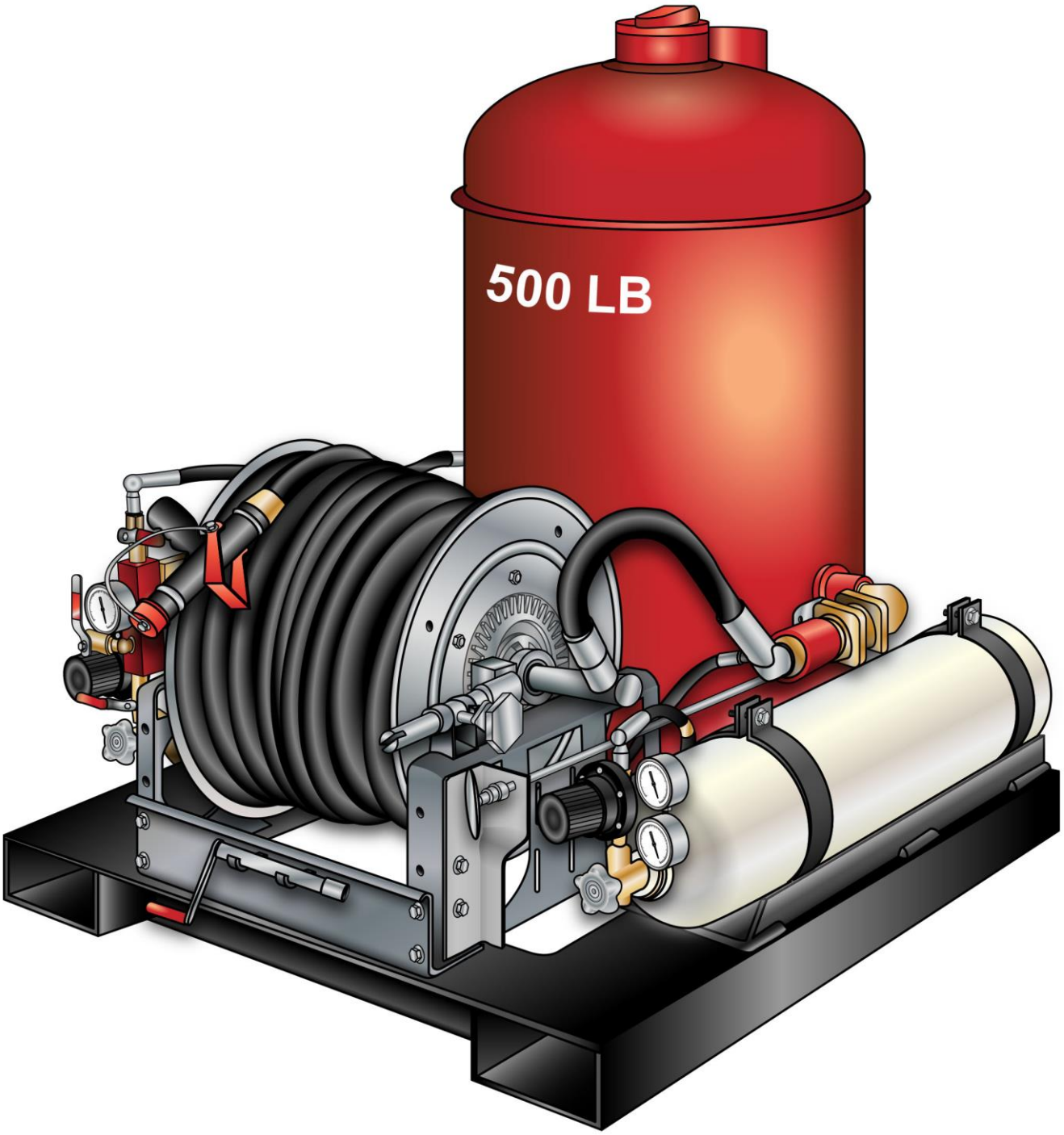

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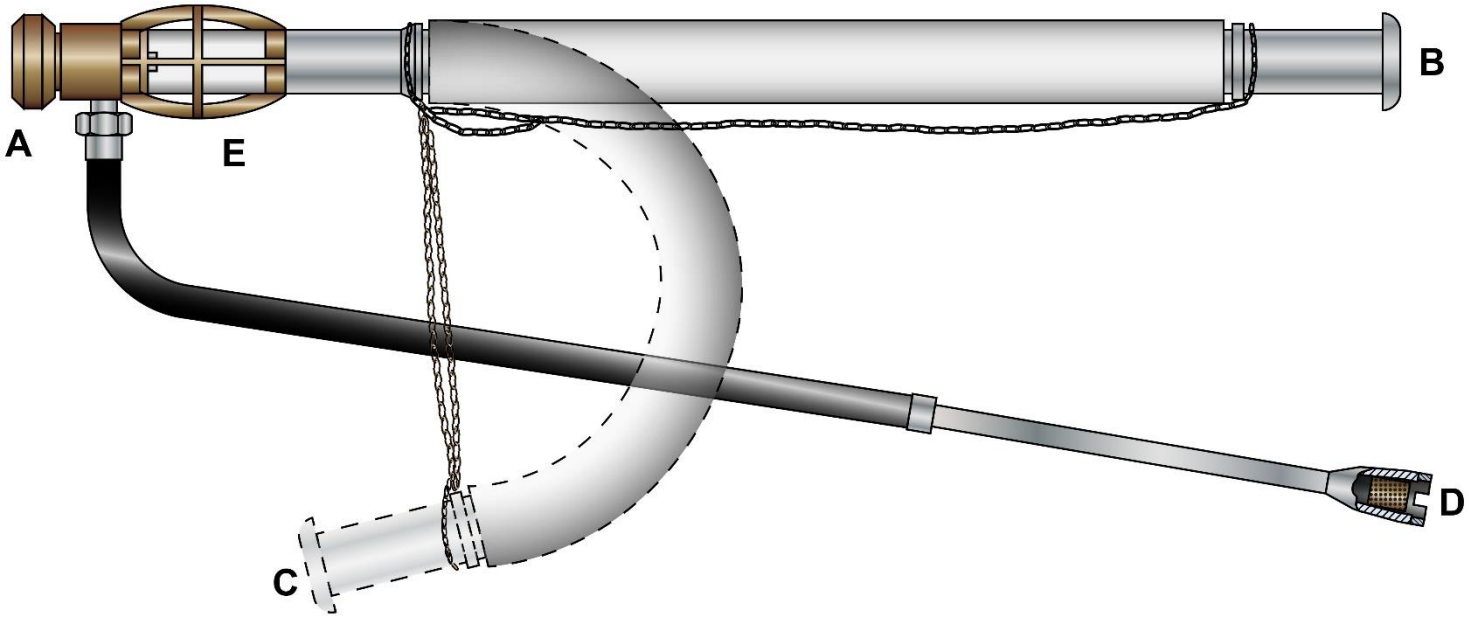

Adapted for testing purposes only A Manual for the Safe Handling of Flammable and Combustible Liquids and Other Hazardous Products CG-174 1976

SF-0034

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