U.S.C.G. Merchant Marine Exam

UFIV – Chief Engineer

Q696 Engineering Safety & Environmental Protection

(Sample Examination)

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

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

   Correct answer: A

2. Which of the methods shown in the illustration is the correct way to fit shoring? Illustration SF-0016

   A. A
   B. B
   C. C
   D. D

   Correct answer: A

3. Your vessel has run aground and upon taking fuel oil tank soundings, you find that a fuel tank level has increased. You therefore should suspect _____.

   A. a crack in the hull portion of the fuel tank
   B. contamination from the saltwater flushing system
   C. condensation in the fuel tank
   D. a load of bad fuel

   Correct answer: A

4. While maneuvering up the East River your vessel runs aground. As the chief engineer of the vessel how would you proceed?

   A. Call your port engineer.
   B. Sound all fuel oil tanks and inspect the engine room bilges and void spaces.
   C. Switch the saltwater cooling suction to the low sea suction.
   D. Wait until the vessel docks to sound the fuel oil tanks.

   Correct answer: B

5. Your ship has run aground, and it is necessary to determine whether or not a compartment has flooded. Therefore, you should _____.

   A. tap the bulkhead with a hammer to check for a water level
   B. open the watertight door and take a quick look
   C. open the hatch dogs on the side away from the hinges
   D. feel the bulkhead to see if it is hot

   Correct answer: A

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

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

   Correct answer: A

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

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

   Correct answer: C

8. While donning the positive pressure self-contained breathing apparatus, you discover that the air cylinder pressure gauge and the regulator pressure gauge differ from each other by 500 psi. Which of the listed actions should you consider as appropriate?

   A. Assume that the lower gauge reading is correct.
   B. Replace the air cylinder.
   C. Take the average of the two gauges as the correct pressure.
   D. Replace the defective gauges with a new pair from the spare parts inventory.

   Correct answer: A

9. In order to retrieve an inflatable life raft and place it on deck, you should heave on the _____.

   A. lifelines
   B. righting strap
   C. sea anchor
   D. towing bridle

   Correct answer: D

10. The purpose of the four water pockets located on the underside of a life raft, is to _____.

    A. stow rainwater; these four spaces will not take up valuable space
    B. act as stabilizers by filling with sea water as soon as raft is inflated and in an upright position
    C. hold the fresh water required by regulation to be provided in the raft when packed
    D. none of the above

    Correct answer: B

11. Which of the following is required to be included in the fireman's (emergency) outfit?

    A. Chemical protection face shield
    B. Approved work vest
    C. Self-contained breathing apparatus
    D. 5 cell approved flashlight

    Correct answer: C

12. 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. station someone at the fixed CO2 release controls
    C. secure all sources of fresh air to the tank
    D. top off the tank to force out all vapors

    Correct answer: C

13. 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. water fog over the fire
    B. solid water streams directly into the fire
    C. dry chemical around the fire
    D. foam directed against the vessel's side

    Correct answer: D

14. 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

    Correct answer: D

15. 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

16. An immersion suit should be equipped with a/an _____.

    A. air bottle for breathing
    B. whistle and hand-held flare
    C. whistle, strobe light, and reflective tape
    D. whistle, hand-held flare, and sea dye marker

    Correct answer: C

17. 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

18. Using a sea anchor with the survival craft will _____.

    A. reduce your drift rate
    B. keep the survival craft from turning over
    C. aid in recovering the survival craft
    D. increase your visibility

    Correct answer: A

19. 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

20. Provided every effort is used to preserve body moisture content by avoiding perspiration, how long is it normally possible to survive in a survival craft without stored quantities of water?

    A. Up to 3 days
    B. Up to 12 days
    C. Up to 25 days
    D. Up to 35 days

    Correct answer: B

21. 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

22. Which of the conditions listed is necessary for a substance to burn?

    A. The air must contain oxygen in sufficient quantity.
    B. The mixture of vapors with air must be between the LEL and the UEL.
    C. The temperature of the substance must be equal to or above its fire point.
    D. All of the above.

    Correct answer: D

23. A fire can be extinguished by removing _____.

    A. the heat
    B. the fuel
    C. the oxygen
    D. any of the above

    Correct answer: D

24. The blocking open or absence of fire dampers can contribute to _____.

    A. the accumulation of explosive gases
    B. faster cooling of the fire
    C. the fire spreading by way of the ventilation system
    D. fixed foam systems to be ineffective

    Correct answer: C

25. Hazardous conditions exist which may result in spontaneous combustion when _____.

    A. powdered aluminum is stowed dry
    B. dry metal turnings accumulate
    C. oil-soaked rags are stowed in the machine shop
    D. all of the above

    Correct answer: C

26. A fire, occurring in the windings, of an overloaded electrical motor, is considered a _____.

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

    Correct answer: C

27. A fire in the paint locker would probably be _____.

    A. Class A
    B. Class B
    C. Class C
    D. Class D

    Correct answer: B

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

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

    Correct answer: A

29. Which of the following procedures reduces the possibility of an interior ventilation duct fire from rapidly spreading?

    A. Having a portable CO_2 ready at each duct opening
    B. Keeping the duct exterior clean
    C. Keeping the duct interior clean
    D. Having a fire hose charged at each duct opening

    Correct answer: C

30. The most likely location for a liquid cargo fire to occur on a tanker would be _____.

    A. in the amidships house
    B. at the main deck manifold
    C. at the vent header
    D. in the pumproom

    Correct answer: D

31. 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

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

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

    Correct answer: B

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

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

    Correct answer: C

34. When an oil fire has been extinguished, the surface of the oil should be kept covered with foam to prevent _____.

    A. air from contacting the oil vapors permitting reignition
    B. spontaneous combustion below the oil surface
    C. boiling of the heated oil
    D. toxic fumes from escaping to the surface

    Correct answer: A

35. 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

36. The state of charge of a stored pressure type dry chemical fire extinguisher can be readily determined by _____.

    A. weighing the cylinder
    B. visual inspection of the pressure gage
    C. weighing the CO2 cartridge
    D. removing the lid and checking the level of dry chemical

    Correct answer: B

37. The passive safety device installed on each Halon fire extinguishing cylinder, to prevent its over pressurization is called a _____.

    A. rupture disc
    B. control head
    C. safety valve
    D. relief valve

    Correct answer: A

38. During an inspection of a ship's storeroom, you find sealed containers of chemicals labeled "potassium bicarbonate" and "potassium chloride". These chemicals are most commonly used aboard ship for _____.

    A. engine jacket water treatment
    B. recharging dry chemical fire extinguishers
    C. degreasing machinery parts
    D. descaling evaporator tubes

    Correct answer: B

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

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

    Correct answer: C

40. Actuating the fixed CO2 system should cause the automatic shutdown of the _____.

    A. mechanical and natural ventilation
    B. supply and exhaust ventilation
    C. fuel supply only
    D. exhaust ventilation only

    Correct answer: B

41. The primary function of an automatic sprinkler system is to _____.

    A. limit the spread of the fire and control the amount of heat produced
    B. instantaneously extinguish the fire which triggered it
    C. protect people in the areas which have had sprinkler heads installed
    D. alert the crew to the fire

    Correct answer: A

42. The most important characteristic of a fire extinguishing agent to be used on electrical fires is for the agent to be _____.

    A. flame resistant
    B. easily removable
    C. non-conducting
    D. wet

    Correct answer: C

43. As chief engineer sailing aboard chemical tankers you frequently review the best practices regarding firefighting during safety meetings. Which of the following would align with industry best practice regarding the use of water in extinguishing chemical fires?

    A. Water is best applied in spray form to smother the chemical fire.
    B. Water is best applied to the chemical fire in a solid stream in order to maximize effectiveness.
    C. Water is best applied from opposing directions to ensure maximum effectiveness.
    D. Water is best used for cooling of the chemical itself as well as surrounding areas.

    Correct answer: D

44. As team leader of the ship's No.2 emergency squad, you have just informed the bridge that the fire in the galley has been extinguished. What would you instruct your squad to do next?

    A. Restock the emergency locker; replacing any equipment used during the fire.
    B. Send them to coffee.
    C. Refill any SCBA bottles used during the fire.
    D. Set a reflash watch in the galley.

    Correct answer: D

45. A fire has been reported in the ship's laundry room. As the senior engineer, you direct the team leader of the No.1 emergency squad to secure ventilation to the space. What would your next command be to the emergency team leader, before they can actually start extinguishing the fire?

    A. Prepare extra portable fire extinguishers.
    B. Prepare the lifeboats to abandon ship.
    C. Prepare extra fire hoses.
    D. Have electrical power secured to the laundry room. A lock-out tag should be placed on the breaker or switch stating the circuit has been de-energized, to protect crew members from electrical shock.

    Correct answer: D

46. As first engineer you are the senior engineering officer in Emergency Squad #1. The fire alarm sounds and you report to the muster station where the bridge informs you smoke has been reported coming from the ship's laundry room. What should your first action be?

    A. Help dress out other crew members in fireman's outfit.
    B. Start boundary cooling the area.
    C. Charge the ship's fire main.
    D. Secure power and ventilation to the laundry room and inform the bridge once this is done.

    Correct answer: D

47. Which of the following conditions is true concerning flammable liquid vapors with a concentration above the upper explosive limit?

    A. The mixture is too lean to burn.
    B. The mixture is too rich to burn.
    C. The vapor is about to explode.
    D. Conditions are perfect for combustion.

    Correct answer: B

48. The "flammable limits" of an atmosphere are the _____.

    A. two temperatures between which an atmosphere will self-ignite
    B. upper and lower percentage of vapor concentrations in an atmosphere which will burn if an ignition source is present
    C. upper and lower pressures between which an atmosphere will not burn
    D. two temperatures between which an atmosphere will burn if an ignition source is present

    Correct answer: B

49. Which of the petroleum products listed has a flash point below 150°F?

    A. Lubricating oils
    B. Road oils
    C. Asphalt
    D. Light fuel oils

    Correct answer: D

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

    A. A liquid
    B. B liquid
    C. E liquid
    D. D liquid

    Correct answer: C

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

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

    Correct answer: D

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

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

    Correct answer: D

53. An LNG carrier has an approved type of gas detecting system to detect methane leaks in the _____.

    A. barrier spaces
    B. cargo handling rooms
    C. boiler burner supply piping
    D. all of the above

    Correct answer: D

54. If the chemical material is a mixture, what must the Safety Data Sheet (SDS) identify?

    A. Paints or coatings that are safe to use with it
    B. The name of each hazardous ingredient
    C. Other similar mixtures of liquids, solids or gases
    D. None of the above

    Correct answer: B

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

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

    Correct answer: B

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

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

    Correct answer: D

57. Victual waste is _____.

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

    Correct answer: A

58. Which of the following statements is true concerning the overboard discharge of vessel sewage at sea?

    A. The vessel must have an approved sewage plant.
    B. The vessel may discharge sewage into the sea, from an approved system which is not comminuted or disinfected, only if the vessel is more than 12 nautical miles from the nearest land.
    C. The vessel may discharge disinfected and comminuted sewage into the sea, from an approved system, only if the vessel is more than 3 nautical miles from the nearest land.
    D. All of the above.

    Correct answer: D

59. According to Coast Guard Regulations (CFR 33 Part 151), all oceangoing tankships of 150 GT and above and all other ships of 400 GT and above are required to prepare, submit, and maintain a USCG approved Oil Record Book and a (an) _____.

    A. shipboard oil pollution emergency plan
    B. vapor recovery procedures plan
    C. oil discharge plan
    D. synthetic plastic discharge plan

    Correct answer: A

60. As chief engineer on a vessel, you and the first engineer are planning a welding job in the cargo-hold. How would you ensure that all safety precautions are reviewed prior to starting this job?

    A. Have the first engineer complete a hot-work permit prior to starting the job.
    B. Have the first engineer verbally review fire safety with crew working on the job.
    C. Have the first engineer review the SOLAS manual prior to starting the job.
    D. Have the first engineer complete a hot-work permit after completing the job.

    Correct answer: A

61. The potable water tanks on your vessel were drained for inspection and cleaning. What would you do before refilling with water?

    A. Disinfect the tank with a chlorine solution.
    B. Disinfect the tank with an ammonia solution.
    C. Use hull paint to touch up bulkheads in the water tanks.
    D. Nothing needs to be done before refilling the tanks.

    Correct answer: A

62. 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. Read an outdated copy of the Ships Medicine Chest reference book found onboard to help treat the injury.
    C. Call your company port engineer and ask for help.
    D. Seek help from fellow crew members who have no medical training.

    Correct answer: A

63. 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

64. An oxygen indicator will detect _____.

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

    Correct answer: A

65. When taking samples of a tank atmosphere with an explosimeter, you should _____.

    A. only sample around the deck longitudinals as gases are lighter than air
    B. avoid sampling in the vicinity of deep webs to prevent false readings
    C. sample as much of the tank as possible, especially at the bottom
    D. sample only near the ullage openings as all vapors accumulate there

    Correct answer: C

66. As chief engineer of an oceangoing passenger vessel, it is important to know the effect of trim and stability of your ship in the event of damage to a compartment. To minimize the impact of flooding in the event of a grounding, what should be your ship's safe practice regarding watertight doors and hatches?

    A. All watertight doors in subdivision bulkheads shall be kept closed during navigation except when necessarily opened for working of the vessel, and in such cases, they shall always be ready to be immediately closed.
    B. All watertight doors in subdivision bulkheads shall be kept open during navigation to facilitate crew movement and in all cases, they shall always be ready to be immediately closed.
    C. All watertight doors in subdivision bulkheads shall be kept closed when the vessel is anchored except when necessarily opened for working of the vessel, and in such cases, they shall always be ready to be immediately closed.
    D. All watertight doors in subdivision bulkheads shall be kept open during normal operation, except during adverse weather when they shall be closed.

    Correct answer: A

67. By what method is the final light ship weight, longitudinal and vertical centers of gravity of a vessel, and final assignment of the load lines determined?

    A. By actually shifting ballast horizontally and longitudinally and relying on resultant calculations
    B. By relying on calculations based on ballasting a light vessel to full load displacement
    C. By relying on resultant calculations from an inclining experiment
    D. By relying on naval architectural design calculations

    Correct answer: C

68. 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

69. Your vessel was damaged in a collision and one compartment has partially flooded. The vessel has free communication with the sea with water flowing in and out as the vessel rolls. Which of the following is the most important factor contributing to free communication loss of stability?

    A. Distance from the vessel centerline to the centerline of the damaged compartment
    B. Breadth of the damaged compartment affected
    C. Depth from the bottom of the damaged compartment to the waterline
    D. Whether or not the damaged compartment on the opposite side of the vessel is full or empty

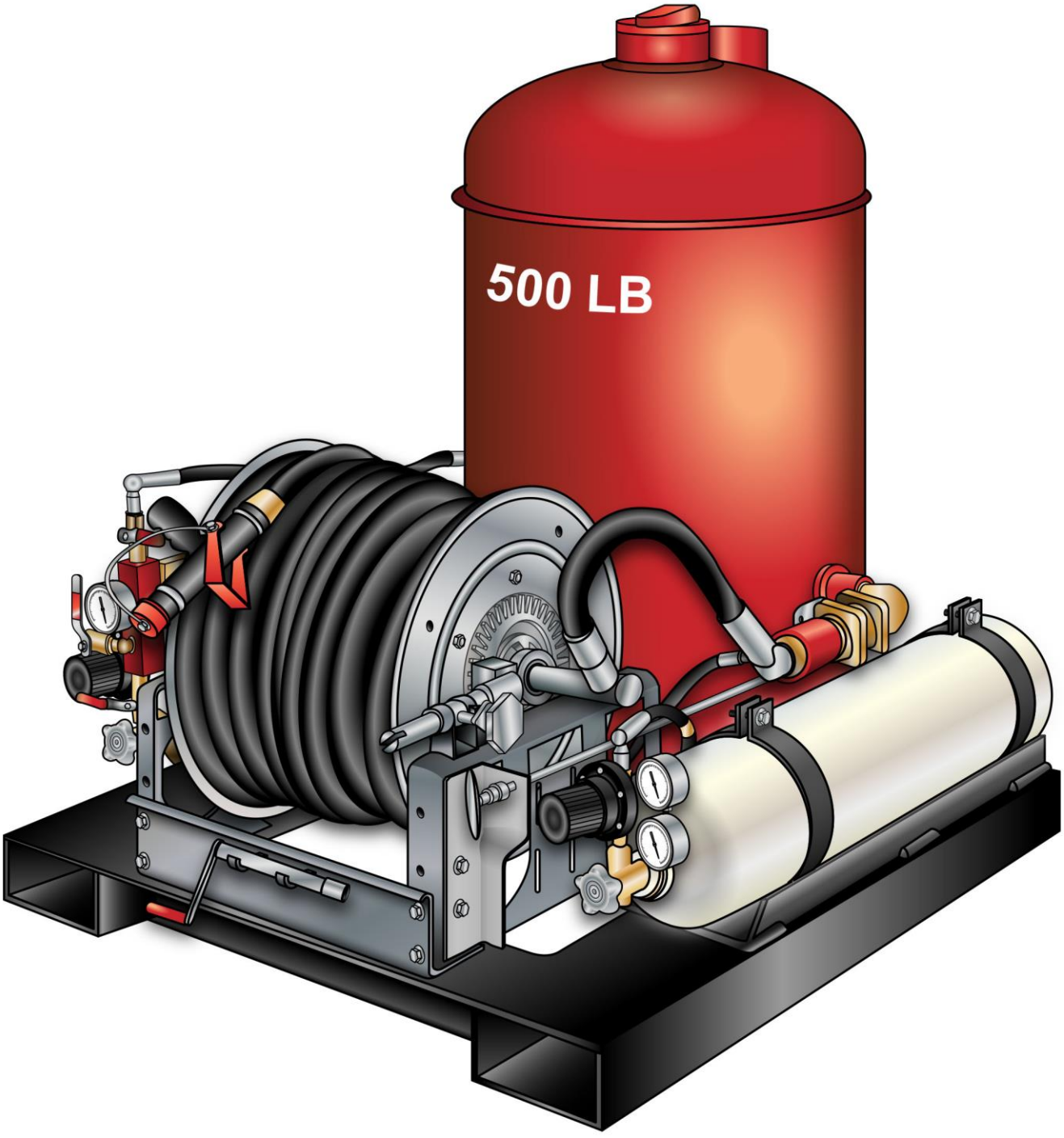
    Correct answer: A

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

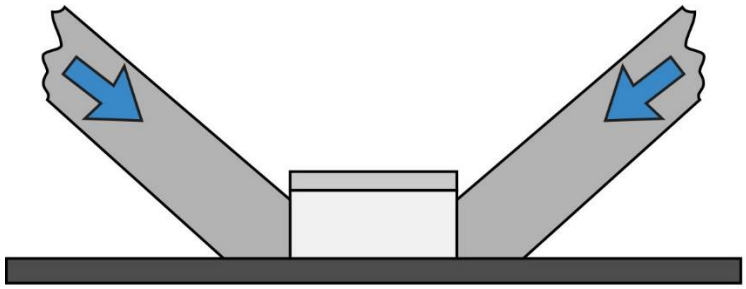
    A. cool the metal below its ignition temperature
    B. form a dense coating of smothering steam
    C. prevent oxygen from reaching the flames
    D. prevent the fire from spreading by the conduction of heat

    Correct answer: D

SF-0009



SF-0016



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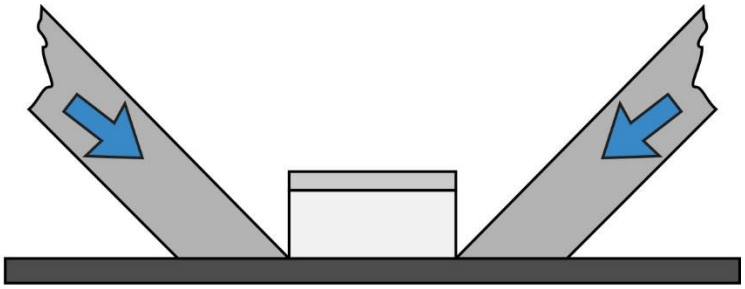

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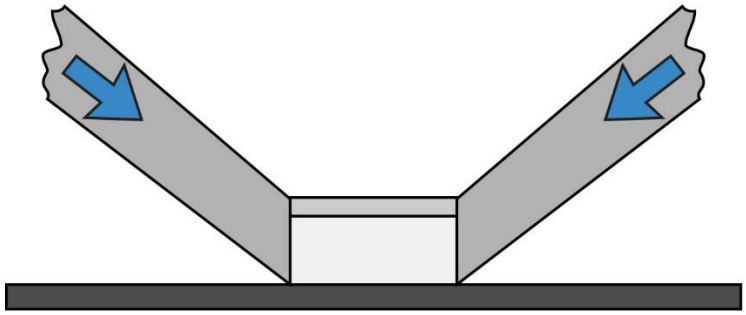

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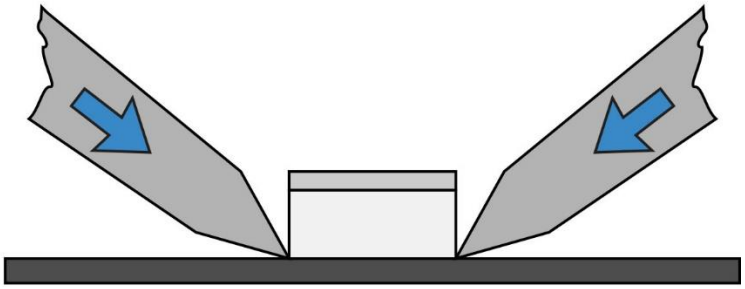

D

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