

## U.S.C.G. Merchant Marine Exam

### Third Assistant Engineer

### Q534 Engineering Safety & Environmental Protection

### (Sample Examination)

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

1. 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. feel the bulkhead to see if it is hot
  - C. open the watertight door and take a quick look
  - D. open the hatch dogs on the side away from the hinges

Correct answer: A

2. An acceptable method of temporarily sealing a crack formed in the hull of a vessel is to \_\_\_\_\_.
- A. shore up the crack with welded braces
  - B. apply a patch of sheet packing backed by a strongback or shoring
  - C. tack weld a doubler plate over the crack
  - D. drill holes at each end

Correct answer: B

3. 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

4. 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

Correct answer: D

5. Which of the following conditions represents a particular advantage of using a positive pressure type self-contained breathing apparatus in an atmosphere that is immediately dangerous to life or health?
- A. The equipment is compact and the wearer can work in confined spaces without difficulty.
  - B. The positive pressure in the facepiece prevents contaminated air from entering the facepiece.
  - C. The average operating time for most air cylinders is over an hour.
  - D. The equipment used is lightweight and easy to wear by reducing physical strain on the wearer.

Correct answer: B

6. Which of the following limitations is correct regarding gas masks, otherwise called filter masks?
- A. All canisters must be discarded within 24 hours when the seal becomes broken.
  - B. A canister is reliable for up to 5 years from the date of manufacture, as long as the seal is unbroken.
  - C. A maximum of only 30 minutes of protection is afforded with a single canister when in atmospheres containing highly toxic gases.
  - D. All of the above.

Correct answer: B

7. Kapok life jackets require proper care and should NOT be \_\_\_\_\_.
- A. left on open decks
  - B. stowed near open flame or where smoking is permitted
  - C. used as seats, pillows, or footrests
  - D. all of the above

Correct answer: D

8. 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

9. In the illustration shown, the sea painter is identified as item number \_\_\_\_\_. Illustration SF-0043
- A. 3
  - B. 6
  - C. 7
  - D. 9

Correct answer: C

10. The hand brake of a lifeboat winch is \_\_\_\_\_.
- A. manually disengaged when hoisting a boat
  - B. applied by dropping the counterweighted lever
  - C. controlled by the centrifugal brake mechanism
  - D. automatically engaged if lowering speed is excessive

Correct answer: B

11. 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

Correct answer: C

12. To activate an air regeneration canister on a survival craft, you \_\_\_\_\_.
- A. put it into a container of water
  - B. tear off the tabs on the canister
  - C. turn it upside down
  - D. push "on" button

Correct answer: B

13. The canopy of your life raft should \_\_\_\_\_.

- A. go into place as the raft is inflated
- B. be put up after everyone is aboard
- C. be put up only in severe weather
- D. be used as a sail if the wind is blowing

Correct answer: A

14. The most important reason for taking anti-seasickness pills as soon as possible after entering a life raft is to \_\_\_\_\_.

- A. assist in sleeping
- B. reduce appetite by decreasing nausea
- C. prevent loss of body moisture by vomiting
- D. prevent impaired judgment due to motion-induced deliriousness

Correct answer: C

15. Which of the following conditions represents the appropriate time for setting off distress flares and rockets?

- A. Immediately upon abandoning the vessel
- B. At half-hour intervals
- C. At one-hour intervals
- D. Only when there is a chance of them being seen by rescue vessels

Correct answer: D

16. 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

17. The air flow depicted in figure 1 of the illustration is an example of which type of ventilation?  
Illustration SF-0013

- A. Vertical
- B. Horizontal
- C. Parallel
- D. Combination

Correct answer: D

18. Radiation can cause a fire to spread by \_\_\_\_\_.

- A. transmitting the heat of a fire through the ship's metal
- B. burning liquids flowing into another space
- C. heated gases flowing through ventilation systems
- D. the transfer of heat across an unobstructed space

Correct answer: D

19. 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

20. A fire in a pile of dunnage would be classified as a \_\_\_\_\_.
- A. class "A"
  - B. class "B"
  - C. class "C"
  - D. class "D"

Correct answer: A

21. 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"

Correct answer: A

22. A magnesium fire would be classified as a \_\_\_\_\_.
- A. class "A"
  - B. class "B"
  - C. class "C"
  - D. class "D"

Correct answer: D

23. When combating a class "C" fire, which of the following dangers may be present?
- A. Toxic fumes from burning insulation or electric shock
  - B. Water damage to machinery not involved in the fire
  - C. Increased surface area of the burning fluid
  - D. Flooding of the vessel

Correct answer: A

24. Which of the following procedures reduces the possibility of an interior ventilation duct fire from rapidly spreading?
- A. Having a portable CO2 ready at each duct opening
  - B. Having a fire hose charged at each duct opening
  - C. Keeping the duct exterior clean
  - D. Keeping the duct interior clean

Correct answer: D

25. When required to work in an area where explosive gases may accumulate, you should use hand tools which are \_\_\_\_\_.
- A. high carbon steel
  - B. fixed with a ferrous cover
  - C. approved by the Coast Guard
  - D. non-ferrous

Correct answer: D

26. The component shown in the illustration would be installed in which of the following types of fire detection systems? Illustration SF-0004
- A. Line-type pneumatic
  - B. Fixed temperature
  - C. Rate-of-rise
  - D. Combined fixed temperature and rate-of-rise

Correct answer: B

27. Which of the following statements is true concerning the Halon 1301 fire extinguishing agent?
- A. Halon extinguishes the fire by a chain breaking reaction.
  - B. The agent is less effective than carbon dioxide.
  - C. The agent is highly toxic as stored in pressurized cylinders.
  - D. The agent cannot be used on electrical fires because it leaves a residue.

Correct answer: A

28. 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

Correct answer: B

29. Which of the following statements is true concerning the fire extinguisher shown in the illustration? Illustration SF-0006
- A. The initial discharge of the extinguisher should be at close range to scatter the burning material.
  - B. The illustrated extinguisher must never be used in conjunction with water.
  - C. The agent may be applied in short bursts by squeezing and releasing the lever on the nozzle.
  - D. There is no danger of reflash in using the illustrated extinguisher on a class "B" fire.

Correct answer: C

30. Annual servicing of a hand portable CO<sub>2</sub> fire extinguisher includes \_\_\_\_\_.
- A. Inspecting the pressure gauge to ensure the needle is within operating range
  - B. Hydrostatic testing of the cylinder
  - C. Weighing the cylinder and recharging if weight loss exceeds 10% of the weight of the charge
  - D. Discharging, cleaning inside, and recharging

Correct answer: C

31. A low velocity fog applicator is retained in an all-purpose nozzle by a bayonet joint. The applicator is prevented from rotating in the joint by \_\_\_\_\_.
- A. a spring-loaded catch
  - B. a keeper screw
  - C. a locknut
  - D. water pressure

Correct answer: A

32. When the cotton cover of a fire hose becomes oily or greasy, it should be washed with a solution of mild soapy fresh water and \_\_\_\_\_.
- A. cornstarch
  - B. a soft-bristled brush
  - C. a wire brush
  - D. paint thinner

Correct answer: B

33. 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 three-way valves to each space simultaneously
  - D. open the applicable three-way valve for No.4 hold. After discharge, secure the valve; then open the applicable valve for No.3 hold

Correct answer: D

34. 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. fire boundary
  - B. safety perimeter
  - C. cooling zone
  - D. buffer zone

Correct answer: A

35. What is the purpose of opening the doors and portholes in figure 2 of the illustration? Illustration SF-0013
- A. To allow venting of combustion products from the fire to the atmosphere
  - B. To provide air flow around the compartment in order to contain the fire
  - C. To keep the hose teams cool
  - D. To allow water used to fight the fire to flow out of the superstructure

Correct answer: A

36. Which of the following statements represents the correct action to take when three crew members discover a fire?
- A. All three men fight the fire and report it immediately after it is extinguished.
  - B. One man reports the fire, one man fights the fire, and one man act as a safety observer.
  - C. One man reports the fire, and the other two men fight the fire.
  - D. One man reports the fire, one man fights the fire, and one man evacuate and secure the area.

Correct answer: D

37. Which of the listed characteristics applies to a semi-portable CO<sub>2</sub> system?
- A. It has distribution piping installed permanently.
  - B. The cylinders are mounted horizontally.
  - C. Each cylinder must weigh less than 50 pounds.
  - D. It has a portable hose and nozzle.

Correct answer: D

38. One of the main concerns when fighting a galley fire is \_\_\_\_\_.
- A. the loss of stability
  - B. spreading of fire through the engineering space
  - C. the igniting of a grease fire in the range hood ventilation system
  - D. contaminating food with extinguishing agent

Correct answer: C

39. The most important characteristic of a fire extinguishing agent to be used on electrical fires is for the agent to be \_\_\_\_\_.
- A. easily removable
  - B. flame resistant
  - C. wet
  - D. non-conducting

Correct answer: D

40. If a fire ignites in the engine room as a result of a high-pressure fuel oil leak, you should FIRST \_\_\_\_\_.
- A. secure the generator
  - B. secure the ventilation
  - C. find a soda acid extinguisher
  - D. shut off the fuel oil supply

Correct answer: D

41. 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



42. Which of the following statements is true regarding oxygen indicators?

- A. Prolonged exposure to gases such as CO<sub>2</sub> may affect the accuracy of the indicator
- B. A cotton filter placed in the end of the sampling tube prevents damaging the instrument when exposed to strongly acidic gases
- C. The instrument is capable of providing an immediate accurate reading of any space with no delay
- D. All of the above

Correct answer: A

43. The reading of a combustible gas indicator indicates the percentage of the \_\_\_\_\_.

- A. Concentration by weight of nonflammable gas in a compartment
- B. Lower explosive limit of a flammable gas concentration
- C. Upper explosive limit of a flammable gas concentration
- D. Concentration of flammable gas in a compartment

Correct answer: B

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

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

Correct answer: A

45. The vapors given off by heated fuel oil are flammable, explosive, and \_\_\_\_\_.

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

Correct answer: D

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

Correct answer: B

47. An LNG carrier has an approved type of gas detecting system to detect methane leaks in the \_\_\_\_\_.

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

Correct answer: D

48. A high concentration of hydrogen sulfide gas is most likely to be found in which of the locations listed?

- A. Fireroom bilges where hydrazine has accumulated.
- B. Sewage compartment bilges where leaked sewage has accumulated.
- C. Engine room bilges where chemical cleaners and solvents have accumulated.
- D. Emergency battery storage compartment where discharge gases have accumulated.

Correct answer: B

49. If emergency welding repairs must be made to the upper area of a fuel tank, the tank and/or adjacent compartments may need to be \_\_\_\_\_.

- A. inerted
- B. gas freed
- C. filled with water
- D. all of the above as necessary

Correct answer: D

50. 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 density
- B. vapor level
- C. vapor gravity
- D. vapor pressure

Correct answer: A

51. Small oil spills on deck can be prevented from contaminating any waters by \_\_\_\_\_.

- A. plugging all scuppers and drains
- B. placing floating booms around the ship
- C. regularly emptying all drip pans
- D. thoroughly draining all bunkering hoses

Correct answer: A

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

- A. One month prior to the anniversary date of the plan
- B. Six months prior to the end of the approval period
- 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

Correct answer: D

53. To determine if all requirements of the Declaration of Inspection are met for oil transfer operations just prior to bunkering from a shoreside facility, \_\_\_\_\_.

- A. vessel and facility must be inspected by a representative of the Coast Guard captain of the port
- B. vessel and facility are jointly and independently inspected by the designated persons in charge
- C. facility is inspected by the designated person in charge of the vessel and vice versa for the vessel
- D. vessel and facility are independently inspected by their respective designated person in charge

Correct answer: B

54. Your vessel is taking on bunkers from a shoreside facility. If oil begins flowing from one tank vent, which of the following actions should be taken FIRST?
- A. Signal the shore control point to shut down.
  - B. Set out drip pans and sawdust and begin to mop up the spill.
  - C. Open the intake valve to an adjacent tank.
  - D. Close the valve on the tank vent line.

Correct answer: A

55. 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

Correct answer: D

56. In accordance with 33 CFR Subchapter O (Pollution), each operation involving the transfer of oil or oily mixture that requires an entry in the Oil Record Book shall be fully recorded \_\_\_\_\_.
- A. Within 24 hours of completion of the project
  - B. Within 48 hours of completion of the operation
  - C. Without delay
  - D. Within 12 hours of completion of the operation

Correct answer: C

57. In accordance with 33 CFR Subchapter O (Pollution), the overall responsibility in maintaining the Oil Record Book is given to the \_\_\_\_\_.
- A. Cargo engineer
  - B. Chief mate
  - C. Chief engineer
  - D. Master

Correct answer: D

58. Reserve buoyancy is the \_\_\_\_\_.
- A. unoccupied space below the waterline
  - B. excess of the buoyant force over gravitational force
  - C. volume of intact space above the waterline
  - D. difference between buoyancy in salt and fresh waters

Correct answer: C

59. Static water pressure on the hull of a ship is greatest at the \_\_\_\_\_.
- A. boot topping
  - B. bow
  - C. stern
  - D. keel

Correct answer: D

60. In accordance with 33 CFR Subchapter O, the term "discharge", as it applies to the pollution regulations, means \_\_\_\_\_.

- A. Leaking
- B. Spilling
- C. Dumping
- D. All of the above

Correct answer: D

61. The Exclusive Economic Zone extends from the baseline of territorial sea of the United States seaward \_\_\_\_\_.

- A. 53 miles
- B. 100 miles
- C. 200 miles
- D. 300 miles

Correct answer: C

62. In accordance with MARPOL (33 CFR Subchapter O), the definition of oil does NOT include which of the following?

- A. Oil refuse
- B. Cooking oil
- C. Sludge
- D. Crude oil

Correct answer: B

63. What is the definition of the stability symbol "KG"?

- A. Height of center of gravity above keel
- B. Height of position of center of floatation
- C. Median period of roll at full load
- D. Height of gravity below metacenter

Correct answer: A

64. A vessel having a concentration of weight toward the top of the vessel is said to be \_\_\_\_\_.

- A. tender
- B. stiff
- C. buoyant
- D. neutral

Correct answer: A

65. Many uninspected motor vessels require load lines. For the purpose of the Load Line Regulations, the term "surveyor" means \_\_\_\_\_.

- A. Any person from the Coast Guard who performs duties with respect to the inspection, enforcement, and administration of Title 52 of the revised statute
- B. Any person designated by the American Bureau of Shipping who actually examines the vessel
- C. An officer of the Coast Guard designated by the commandant to command all Coast Guard activities within his district
- D. Any person from the Coast Guard who is in charge of a marine inspection zone

Correct answer: B

66. A gurgling noise is heard from within a cargo tank when discharging cargo, this would indicate that the \_\_\_\_\_.
- A. pump discharge pressure is excessive
  - B. tank liquid is too viscous
  - C. pump is sucking air
  - D. tank foot valve is partially clogged

Correct answer: C

67. A vessel's center of gravity is lowered when the \_\_\_\_\_.
- A. reserve buoyancy increases
  - B. freeboard is increased
  - C. tanks are ballasted
  - D. trim is increased

Correct answer: C

68. When a vessel is inclined, the tendency for it to return to its original position is caused by the \_\_\_\_\_.
- A. upward movement of the center of flotation
  - B. increased free surface in the buoyant wedge
  - C. movement of the center of buoyancy toward the low side of the vessel
  - D. movement of the center of gravity

Correct answer: C

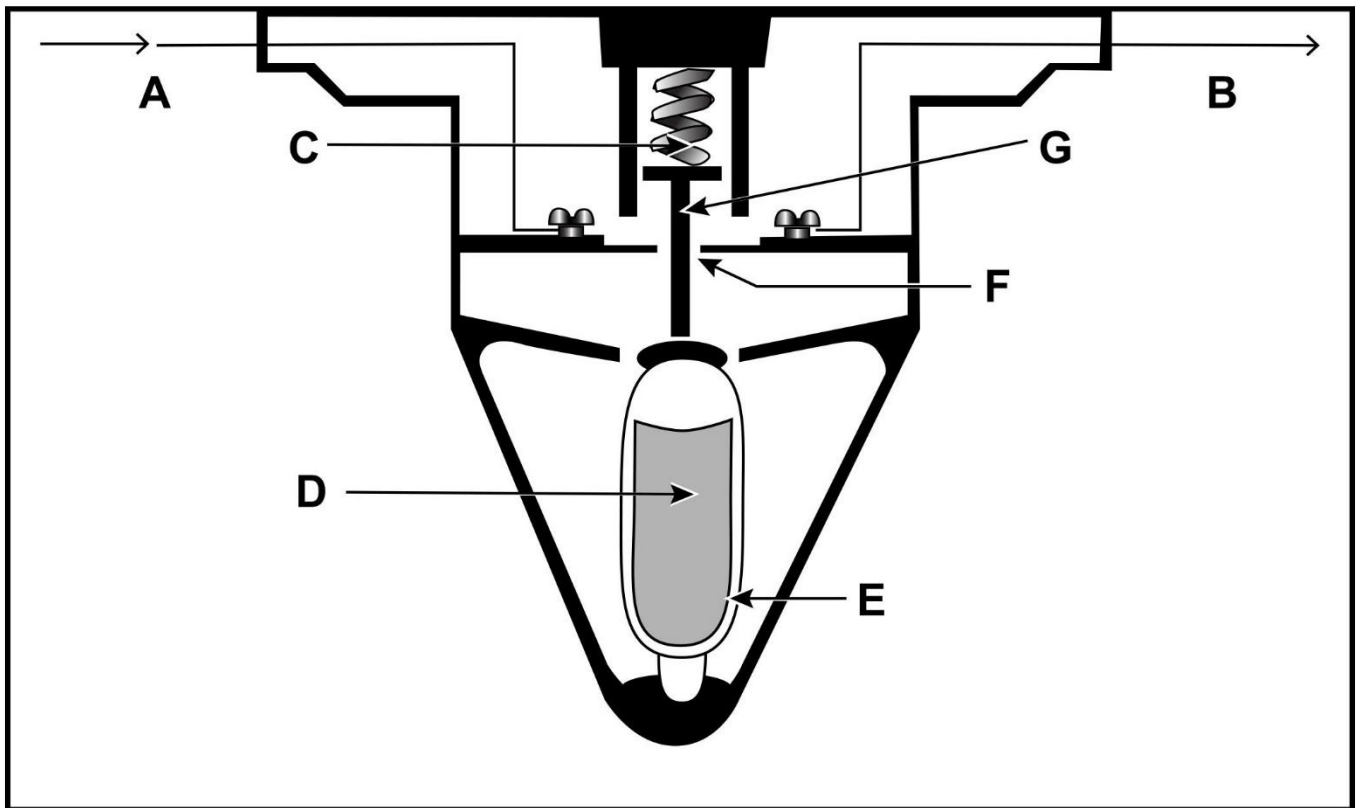
69. If a vessel rolls to the starboard side, and there are no movable or moving weights onboard, the center of gravity will \_\_\_\_\_.
- A. move to starboard
  - B. stay in the same position
  - C. move directly down
  - D. move to port

Correct answer: B

70. You may improve a vessel's stability by \_\_\_\_\_.
- A. increasing the free surface effect
  - B. keeping at least one fuel tank empty for slops
  - C. keeping the fuel tanks topped off
  - D. keeping the fuel tanks at least half full

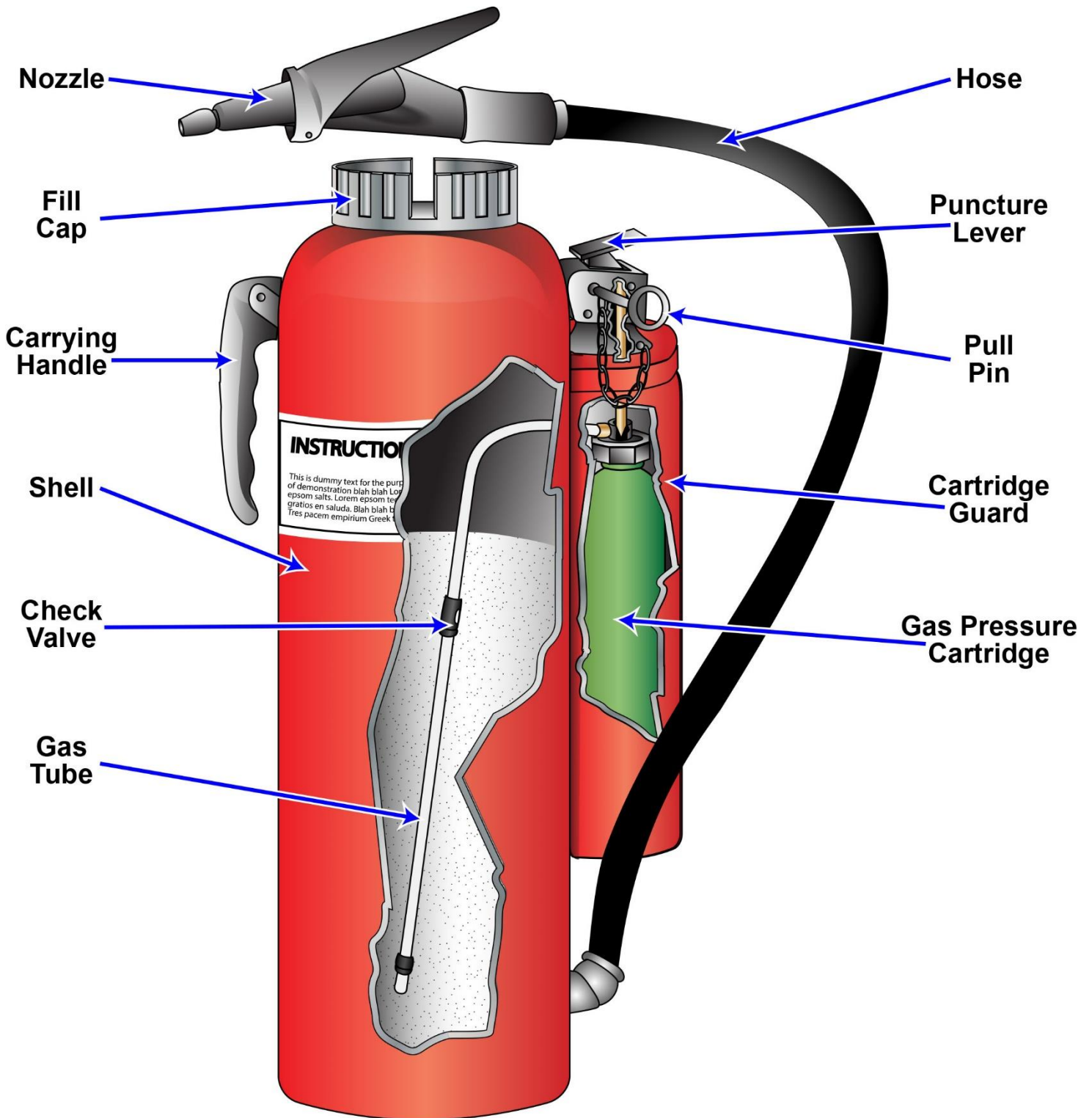
Correct answer: C

## SF-0004



Adapted for testing purposes only from Marine Fire Prevention, Firefighting and Fire Safety  
U.S. Department of Transportation Maritime Administration  
Further reproduction prohibited without permission

## SF-0006



Adapted for testing purposes only from Damage Controlman  
NAVEDTRA 14057  
Further reproduction prohibited without permission

## SF-0013

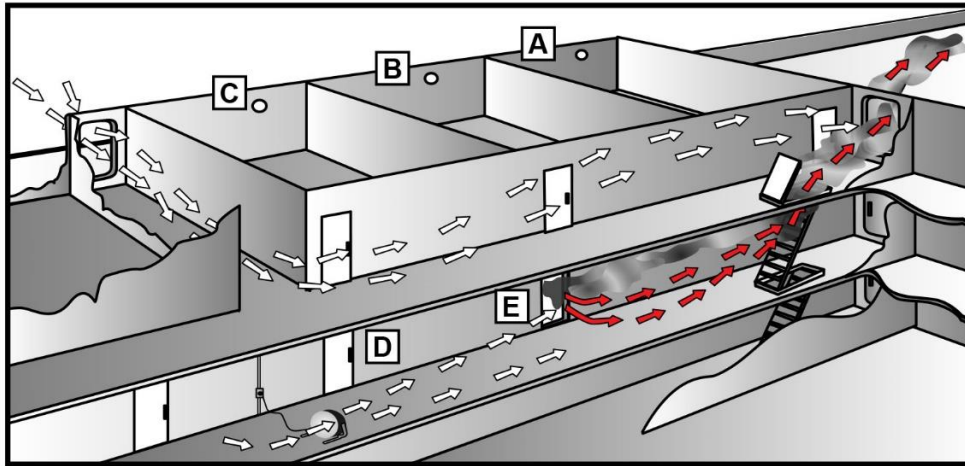


Figure 1

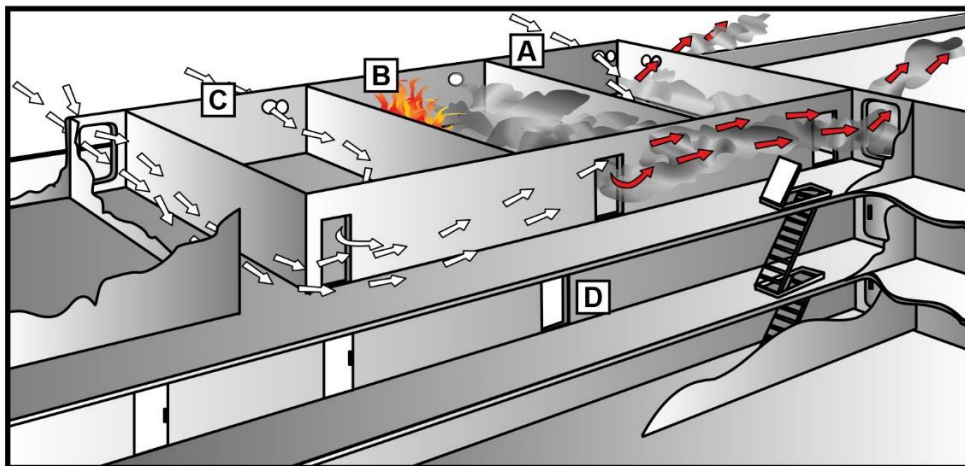


Figure 2

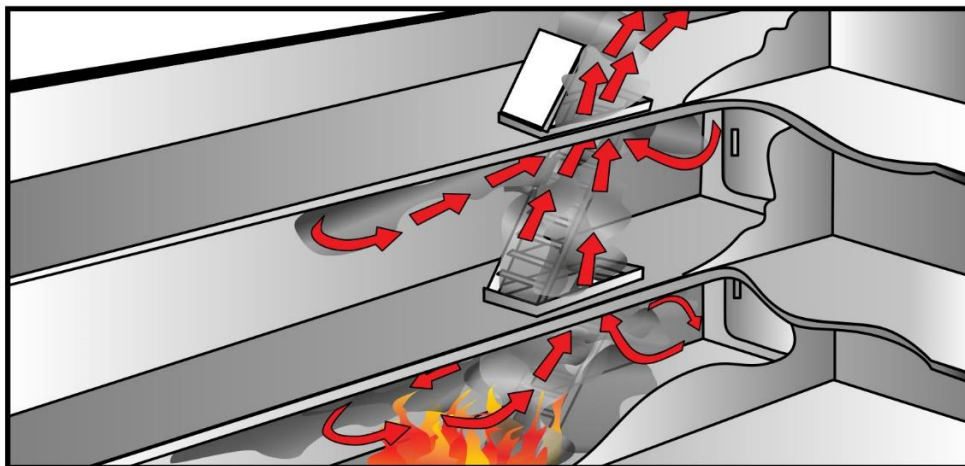
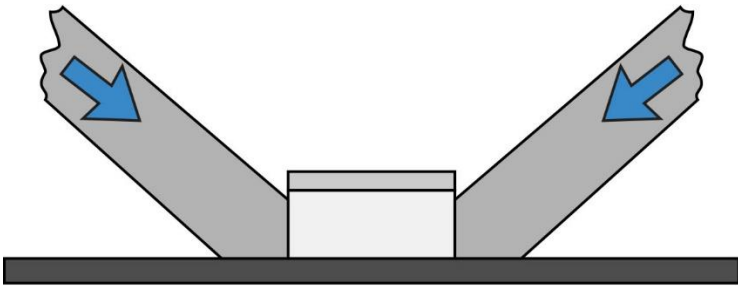


Figure 3

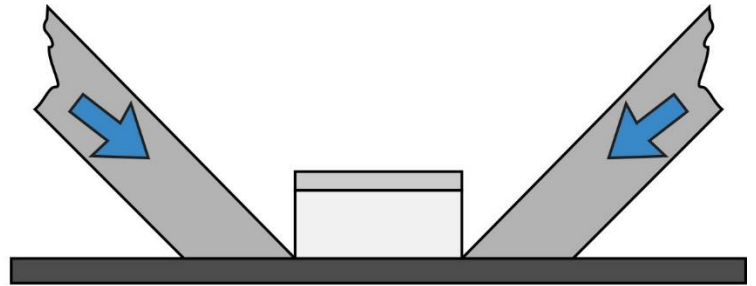
Adapted for testing purposes only from Marine Fire Prevention, Firefighting and Fire Safety  
U.S. Department of Transportation Maritime Administration  
Further reproduction prohibited without permission



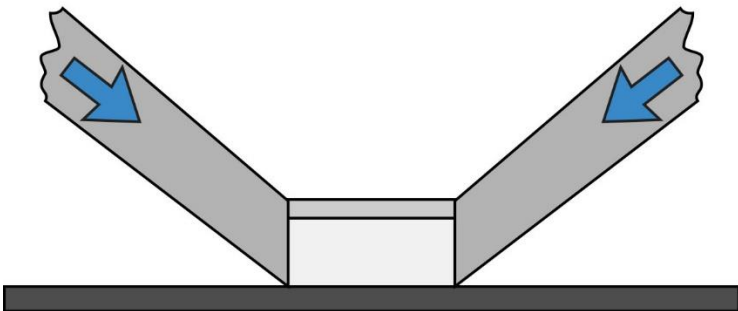
## SF-0016



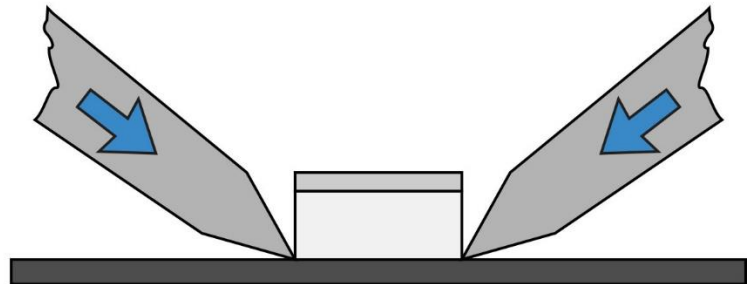
A



B



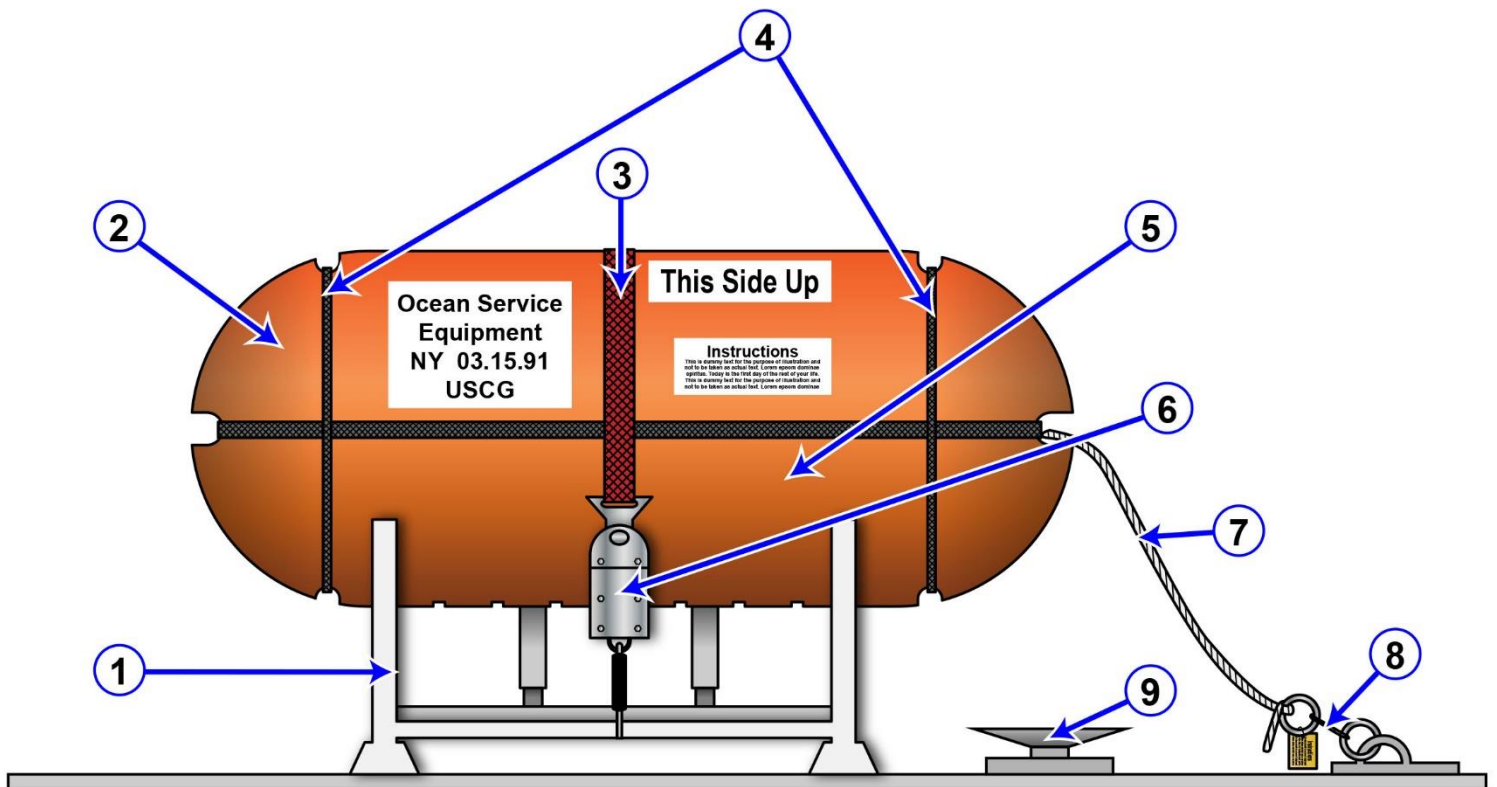
C



D

Adapted for testing purposes only from Damage Controlman  
NAVEDTRA 14057  
Further reproduction prohibited without permission

## SF-0043



Adapted for testing purposes only from MEURN, Survival Guide for the Mariner, 2nd Ed.  
Copyright © 1993 Cornell Maritime Press, Inc.  
Further reproduction prohibited without permission