

U.S.C.G. Merchant Marine Exam

DDE – Unlimited HP

Q623 Engineering Safety & Environmental Protection

(Sample Examination)

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

1. Which of the components listed are interchangeable between different backpack self-contained breathing apparatus produced by various manufacturers?
- A. The air cylinder
 - B. The facepiece
 - C. The regulator
 - D. All of the above

Correct answer: A

2. Which of the devices listed would be safe to use in a compartment with insufficient oxygen?
- A. Canister type mask
 - B. Dust or gas mask
 - C. Wet handkerchief
 - D. Self-contained breathing apparatus

Correct answer: D

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

Correct answer: B

4. When fighting a liquefied natural gas fire, you should _____.
- A. secure the source of gas, then extinguish the fire
 - B. use only carbon dioxide
 - C. use only dry chemical
 - D. extinguish the fire, then secure the source of gas

Correct answer: A

5. After measuring the length to which a section of shoring should be cut, you should cut the shoring _____.
- A. approximately 1/2 inch longer than the measured length to allow for trimming
 - B. approximately 1/2 inch shorter per foot of the measured length to allow for wet expansion
 - C. to the same length as the measured length
 - D. approximately 1/2 inch shorter than the measured length to allow for the use of wedges

Correct answer: D

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

Correct answer: C

7. Your ship has run aground and it is necessary to determine whether or not a compartment has flooded. Therefore, you should _____.
- A. open the watertight door and take a quick look
 - B. feel the bulkhead to see if it is hot
 - C. tap the bulkhead with a hammer to check for a water level
 - D. open the hatch dogs on the side away from the hinges

Correct answer: C

8. A flat block placed under the end of a shore for the purpose of distributing pressure is referred to as a _____.
- A. shole
 - B. shore foot
 - C. strongback
 - D. butt piece

Correct answer: A

9. The wooden plug fitted tightly in the vent of a damaged tank may prevent the tank from _____.
- A. filling completely
 - B. developing free surface moments
 - C. developing free surfaces
 - D. collapsing

Correct answer: A

10. 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

11. 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

12. 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

13. When the survival craft is supplied with bottles of compressed air, they are used for _____.

- A. personnel air supply
- B. additional flotation
- C. priming the sprinkler system
- D. filling the self-righting bags

Correct answer: A

14. While retrieving the survival craft, the engine should be stopped _____.

- A. when the craft clears the water
- B. when the cable has been attached
- C. on approach to the platform
- D. at the embarkation

Correct answer: A

15. Using a sea anchor when in a life raft will _____.

- A. reduce the drift rate of the life raft
- B. keep the life raft from turning over
- C. aid in recovering the life raft
- D. increase your visibility

Correct answer: A

16. If a life raft should capsize, _____.

- A. climb onto the bottom
- B. swim away from the raft
- C. right the raft using the righting straps
- D. inflate the righting bag

Correct answer: C

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

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

Correct answer: C

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

Correct answer: C

19. Span gas is used aboard liquefied natural gas carriers to _____.
- A. detect leaks in cargo piping
 - B. odorize the cargo
 - C. inert the barrier spaces
 - D. calibrate the gas leak detectors

Correct answer: D

20. The process that occurs when heat is generated by a chemical reaction within a substance and continues to a point of ignition is known as _____.
- A. spontaneous combustion
 - B. chemical combustion
 - C. chemical ignition
 - D. radiation ignition

Correct answer: A

21. 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

22. To prevent oily rags from spontaneously igniting they should be _____.
- A. kept in nonmetal containers
 - B. cleaned thoroughly for reuse
 - C. discarded as soon as possible
 - D. kept in the paint locker

Correct answer: C

23. To prevent the spread of fire by convection you should _____.
- A. shut off electrical power
 - B. cool the bulkhead around the fire
 - C. close all openings to the area
 - D. remove combustibles from direct exposure

Correct answer: C

24. Hazardous conditions exist which may result in spontaneous combustion when _____.
- A. oil-soaked rags are stowed in the machine shop
 - B. powdered aluminum is stowed dry
 - C. dry metal turnings accumulate
 - D. all of the above

Correct answer: A

25. The upper explosive limit (UEL) of a mixture of flammable vapors and air is defined as _____.
- A. that concentration above which there is just enough flammable vapor to produce an explosion
 - B. that concentration above which the mixture is too rich to burn
 - C. the percentage of flammable vapor by volume in air sufficient to create an explosion
 - D. the percentage of oxygen present in the air sufficient to support combustion

Correct answer: B

26. Fire detecting systems on merchant vessels may be arranged to sense _____.
- A. rate of temperature rise
 - B. ionized particles
 - C. smoke
 - D. all of the above

Correct answer: D

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

Correct answer: D

28. Which of the following statements is true concerning carbon dioxide when used as a fire extinguishing agent?
- A. Carbon dioxide should be applied slowly to a large engine room fire.
 - B. Its total cooling effect is far greater than water.
 - C. Its smothering effect is excellent for class "B" fires.
 - D. Carbon dioxide is corrosive when exposed to fire.

Correct answer: C

29. Annual servicing of a hand portable CO₂ fire extinguisher includes _____.
- A. Weighing the cylinder and recharging if weight loss exceeds 10% of the weight of the charge
 - B. Inspecting the pressure gauge to ensure the needle is within operating range
 - C. Hydrostatic testing of the cylinder
 - D. Discharging, cleaning inside, and recharging

Correct answer: A

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

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

Correct answer: C

31. 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)

Correct answer: D

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. a soft-bristled brush
- B. paint thinner
- C. cornstarch
- D. a wire brush

Correct answer: A

33. The source of power for the CO₂ discharge alarm siren is obtained from _____.

- A. The general alarm 24-volt DC bus
- B. The flow of CO₂ under pressure
- C. The emergency power and lighting bus
- D. All of the above

Correct answer: B

34. 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 evacuate and secure the area.
- C. One man reports the fire, one man fights the fire, and one man act as a safety observer.
- D. One man reports the fire, and the other two men fight the fire.

Correct answer: B

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

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

Correct answer: C

36. During cargo operations, a deck fire has occurred due to a leaking cargo line. You should FIRST _____.

- A. apply CO₂ on the burning fuel at its source
- B. blanket the cargo spill with foam
- C. prevent the spread of fire with a foam dam
- D. stop the transfer of cargo

Correct answer: D

37. Which extinguishing agent is the best for use on electrical fires?

- A. Dry chemical
- B. Foam
- C. Water fog
- D. CO₂

Correct answer: D

38. When combating a major electrical fire at sea, the main consideration is _____.

- A. reducing the possibility of electrical shock to personnel
- B. preventing saltwater damage to electrical equipment
- C. eliminating the toxic fumes from burning insulation
- D. preventing a total loss of electrical power

Correct answer: A

39. A large fire has developed in the HFO centrifuge room accessed by door "E". To combat the fire, you should _____. Illustration SF-0013

- A. Cool adjoining horizontal and vertical surfaces before opening the door to extinguish the fire
- B. Only need to set up a hose team to cool the door, then open the door and extinguish the fire using a type B-II extinguisher
- C. Advance the hose team into the room without any additional preparatory action
- D. Keep the door tightly closed until all the oil has been consumed by the fire

Correct answer: A

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

- A. harder it is to extinguish
- B. easier it is to control
- C. less chance there is of reignition
- D. easier it is to extinguish

Correct answer: A

41. The worst atmospheric condition for dispersion of hydrogen sulfide is _____.

- A. full sun with high winds
- B. nearly calm, clear nights or early morning
- C. gusty winds with rain
- D. heavy rain

Correct answer: B

42. The explosive range of methane is 5% to 15% by volume in air. This means a vapor/air mixture of _____.

- A. 3 percent methane by volume is too rich to burn
- B. 5 percent methane by volume will give a reading of 100 percent LEL on a combustible gas indicator
- C. 10 percent methane by volume is too rich to burn
- D. 20 percent methane by volume is too lean to burn

Correct answer: B

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

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

Correct answer: D

44. 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

Correct answer: A

45. The reading of a combustible gas indicator indicates the percentage of the _____.

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

Correct answer: D

46. If you see an individual fall overboard, what is the FIRST thing you should do?

- A. throw a life ring overboard
- B. hail "Man Overboard"
- C. pass the word to the bridge
- D. sound three prolonged blasts

Correct answer: A

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

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

Correct answer: B

48. When discharging clean ballast, prior to entering the loading port, if the ballast is determined by the oil monitor to exceed 15 parts per million of oil, the deballasting must _____.
- A. be completed only after "load on top" has been completed
 - B. be completely discharged in order to load
 - C. be stopped until the oil can settle out, then resumed at a slower discharge rate
 - D. be terminated automatically

Correct answer: D

49. 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. Absorbent removal
 - C. Chemical agent removal
 - D. None of the above

Correct answer: B

50. Victual waste is _____.
- A. The final discharge of sewage treatment plants
 - B. The resultant sludge that is collected after water washing a boiler
 - C. Any garbage that comes from food or food provisions
 - D. The final waste product of a manufacturing process

Correct answer: C

51. 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. Open the intake valve to an adjacent tank.
 - B. Signal the shore control point to shut down.
 - C. Set out drip pans and sawdust and begin to mop up the spill.
 - D. Close the valve on the tank vent line.

Correct answer: B

52. An ullage reading is the distance from a given point at the _____.
- A. sounding tube to either side of the tank
 - B. top of the liquid down to the tank bottom
 - C. top of the tank down to the bottom of the tank
 - D. top of the sounding tube down to the surface of the liquid

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

Correct answer: B

54. In accordance with 33 CFR Subchapter O (Pollution), a shipboard oil pollution emergency plan is required to be reviewed _____.
- A. Annually only
 - B. Biennially only
 - C. Quad-annually only
 - D. Only once every five years

Correct answer: A

55. U.S. flag ships may obtain an Oil Record Book from the _____.
- A. Environmental Protection Agency
 - B. Local courthouse
 - C. Local MSO/COTPs/MIO's
 - D. U.S. Customs Agency

Correct answer: C

56. Bunker "C" is classified as a grade _____.
- A. "A" liquid
 - B. "B" liquid
 - C. "E" liquid
 - D. "D" liquid

Correct answer: C

57. The explosive range of petroleum vapors when mixed with air is _____.
- A. 0% to 1% by volume
 - B. 1% to 6% by volume
 - C. 6% to 12% by volume
 - D. 12% to 20% by volume

Correct answer: B

58. Individuals who have consumed alcohol within 24 hours of exposure to H₂S can tolerate _____.
- A. unusually large concentrations of H₂S
 - B. smaller than normal concentrations of H₂S
 - C. moderate concentrations of H₂S without the usual reactions
 - D. longer exposure to H₂S concentrations

Correct answer: B

59. A tank or compartment is "gas free" when there is an absence of dangerous concentrations of _____.
- A. residues from cargo oil
 - B. flammable or toxic gases
 - C. all flammable liquids
 - D. any combustible liquid

Correct answer: B

60. 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. Safety Data Sheet
 - B. Hazardous Chemical Loading Document
 - C. Hazardous Chemical Information Sheet
 - D. Physical/Chemical Characteristics Document

Correct answer: A

61. If additional weight is placed on the main deck of the vessel shown in the illustration _____.
Illustration SF-0023
- A. GM will increase
 - B. G will rise
 - C. KB will go down
 - D. K will rise

Correct answer: B

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

Correct answer: C

63. If the cause of severe list or trim of a vessel is due to off-center ballast, counter-flooding into empty tanks will _____.
- A. increase the righting arm
 - B. increase the righting moment
 - C. increase list or trim
 - D. decrease list or trim

Correct answer: D

64. In the absence of external forces, the center of gravity of a floating vessel is located directly above the _____.
- A. center of flotation
 - B. metacenter
 - C. amidships
 - D. geometric center of the displaced volume

Correct answer: D

65. The symbol shown in the illustration and used as a reference from which the height of the center of gravity is measured, is item number _____. Illustration SF-0022
- A. 5
 - B. 4
 - C. 3
 - D. 2

Correct answer: D

66. Which abbreviation represents the height of the center of buoyancy?

- A. KB
- B. CB
- C. BK
- D. BM

Correct answer: A

67. A vessel trimmed down by the bow has _____.

- A. zero trim
- B. a greater draft aft than forward
- C. a greater draft forward than aft
- D. a low mean draft

Correct answer: C

68. Excessive free surface occurring in tanks carrying liquid cargo should be avoided in order to _____.

- A. maintain good stability
- B. prevent oil pollution
- C. maintain hog and sag
- D. all of the above

Correct answer: A

69. In accordance with 46 CFR Subchapter W, the fuel tanks of motor-propelled lifeboats shall be _____.

- A. Emptied and the fuel changed at least once each year
- B. Emptied and gas freed when the ship is dry-docked
- C. Constructed so as to be completely spill proof
- D. Hydrostatically tested at each inspection for certification

Correct answer: A

70. The Pollution Prevention Regulations, (33 CFR Subchapter O) require a meeting before starting any oil transfer operation. That meeting must be between which of the following people?

- A. Master and chief engineer of the vessel and the terminal supervisor
- B. Master of the vessel and the terminal superintendent
- C. Person in charge of the oil transfer operations on the vessel and the person in charge of the oil transfer operations at the facility
- D. Terminal supervisor, master of the vessel and the Coast Guard

Correct answer: C

SF-0013

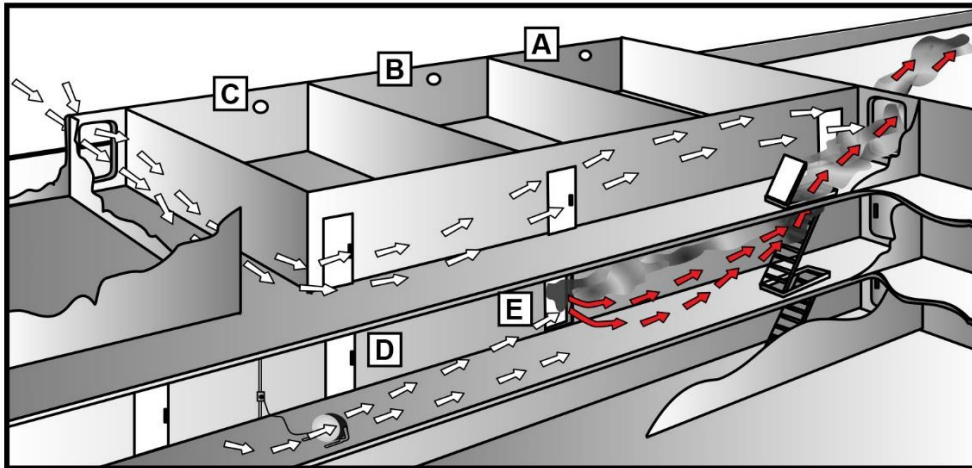


Figure 1

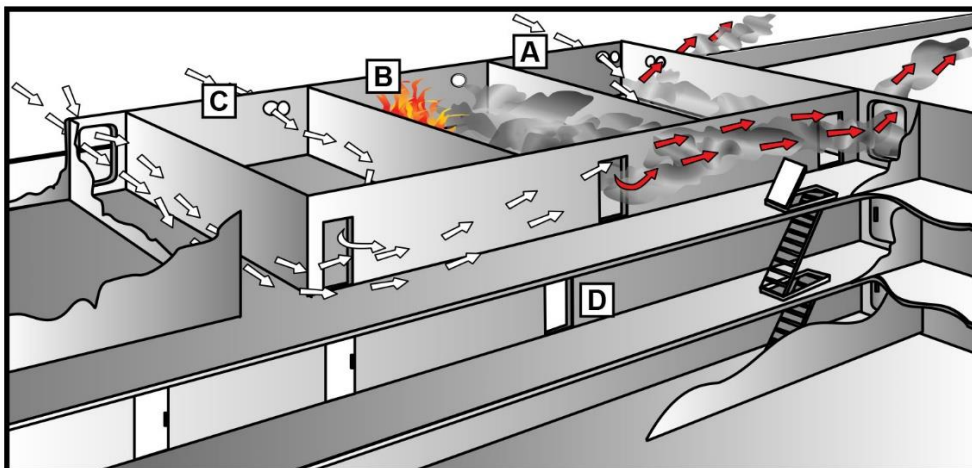


Figure 2

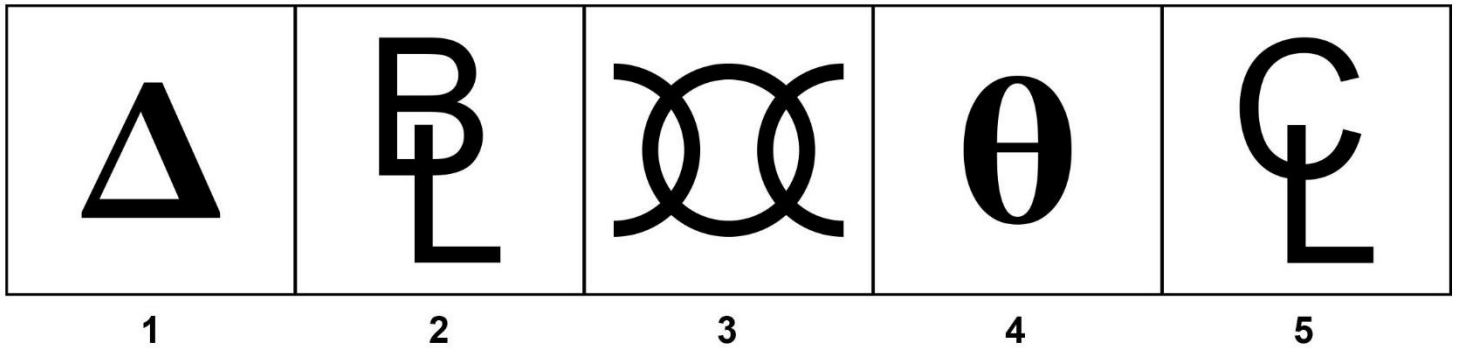


Figure 3

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SF-0022

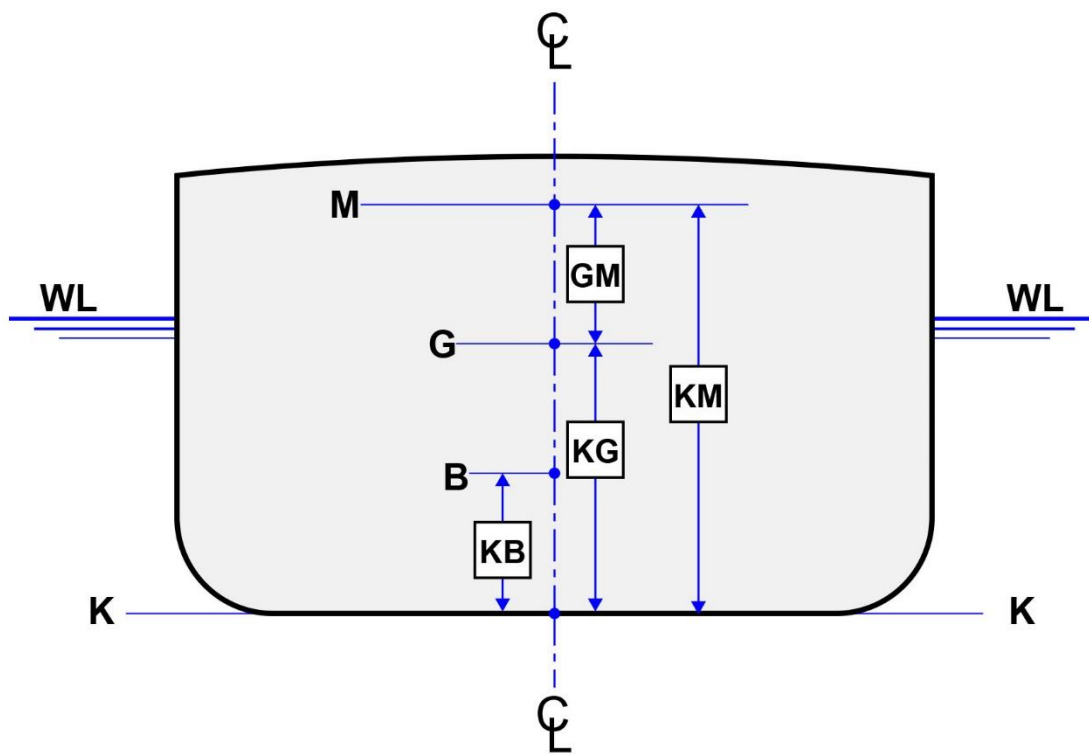
**Vessel Dimensional
Data Symbols**



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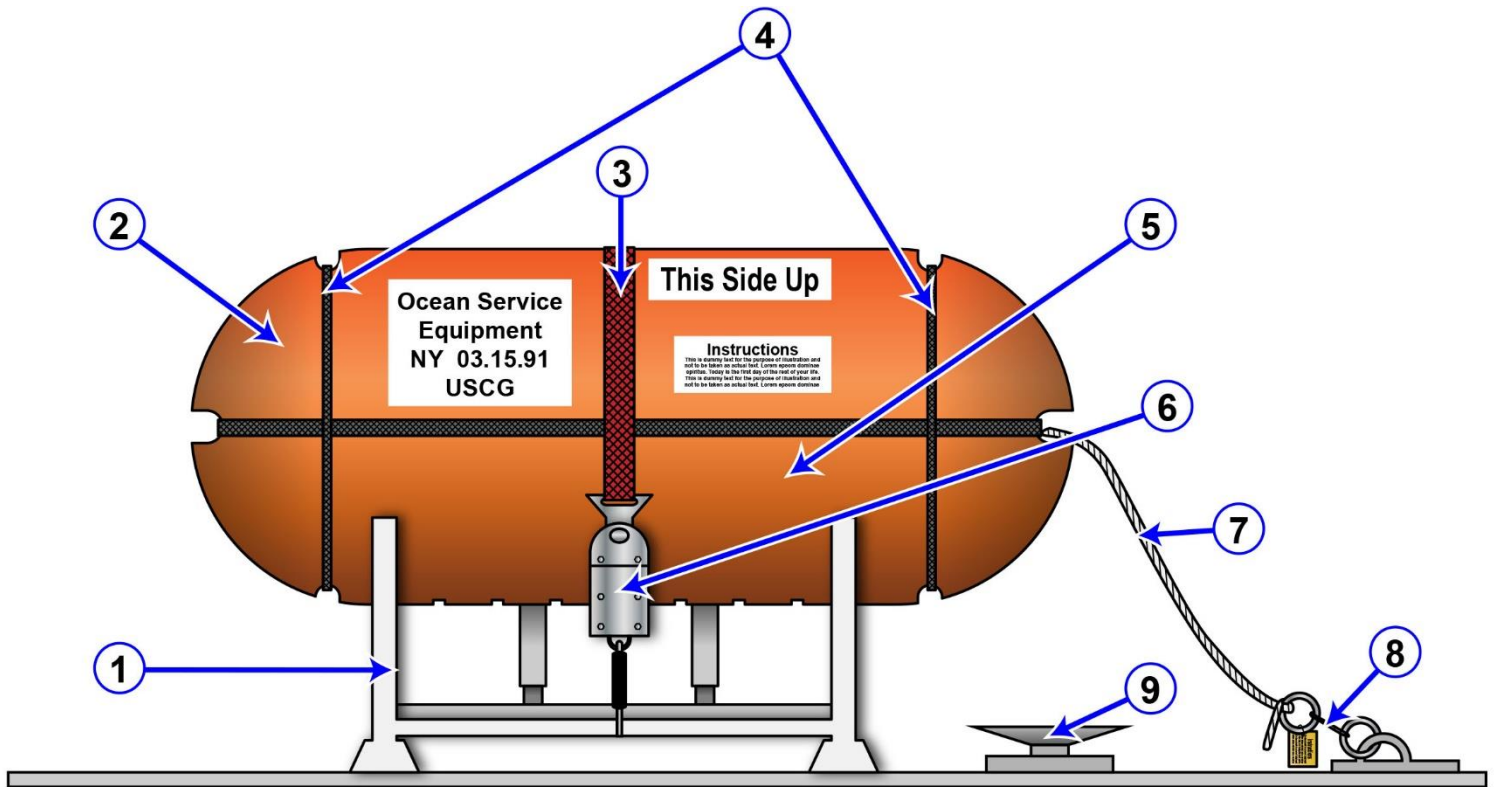
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Stability Calculations



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