

U.S.C.G. Merchant Marine Exam

Second Mate to Master
Less than 1600 Gross Registered Tons

Q131 Deck Safety – Stability Problems

(Sample Examination)

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

1. Your vessel has a beam of 40 feet, and you observe a still water rolling period of 20 seconds. What is the vessel's metacentric height?
 - A. 0.3 ft.
 - B. 0.5 ft.
 - C. 0.8 ft.
 - D. 1.1 ft.

Correct answer: C

2. You are loading in a port subject to the winter load line mark and bound for a port subject to the tropical load line mark. You will enter the summer zone after steaming four days, and you will enter the tropical zone after a total of twelve days. You will consume 39 tons of fuel, water, and stores per day. The hydrometer reading at the loading pier is 1.025, and the average TPI is 49. What is the minimum freeboard required at the start of the voyage? Reference Table BL-0010 below.

BL-0010

FREEBOARD FROM DECK LINE		LOAD LINE	
Tropical	76 inches	(T)	7 inches above (S)
Summer	83 inches	(S)	*
Winter	90 inches	(W)	7 inches below (S)
Fresh water allowance	10 inches		

- A. 90 inches
- B. 87 inches
- C. 80 inches
- D. 77 inches

Correct answer: A

3. Of the following, which is the most important consideration for a tank vessel?
 - A. The longitudinal center of gravity
 - B. GM
 - C. The vertical center of gravity
 - D. The stress on the hull

Correct answer: D

4. Your vessel's drafts are: FWD 27'-06", AFT 28'-02"; and the KG is 21.3 feet. Use the selected stability curves in the blue pages of the Stability Data Reference Book to determine the righting arm at 15° inclination.
 - A. 0.3 foot
 - B. 1.3 feet
 - C. 1.5 feet
 - D. 1.8 feet

Correct answer: C

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5. The SS AMERICAN MARINER is ready to bunker with drafts of FWD 21'-04", AFT 26'-04". After all bunkers are on board, soundings indicate the tonnages shown in table ST-0177 below. Use the white pages of The Stability Data Reference Book to determine the free surface correction.

ST-0177

DB 1 CL	48.2	DB 6 P	87.0
DB 1A CL	81.9	DB 6 S	87.0
DB 2 P	71.2	DB 7 P	66.2
DB 2 S	71.2	DB 7 S	58.4
DB 3 CL	227.6	DT 1 CL	125.3
DB 3 P	55.6	DT 1A CL	235.6
DB 3 S	55.6	DT 3 P	86.1
DB 4 CL	224.1	DT 3 S	86.1
DB 4 P	87.0	DT 6 P	201.2
DB 4 S	87.0	DT 6 S	201.2
DB 5 CL	196.2	DT 7 P	128.8
DB 6 CL	242.3	DT 7 S	128.8

- A. 0.62 foot
 B. 0.80 foot
 C. 0.85 foot
 D. 0.99 foot

Correct answer: A

6. Your sailing drafts are: FWD 14'-04", AFT 16'-02" and the GM is 3.0 feet. What will be the angle of list if #5 port double bottom (capacity 195 tons, VCG 2.6 feet, and 18.5 feet off the centerline) is filled with saltwater? (Use the data in Section 1, the blue pages, of the Stability Data Reference Book)
- A. 4°
 B. 8°
 C. 13°
 D. 16°

Correct answer: B

7. The SS AMERICAN MARINER is loaded with the cargo shown in table ST-0076 below. Use the white pages of The Stability Data Reference Book to determine the amount of liquid loading required in the double bottom tanks to meet a one compartment standard.

ST-0076

Deck cargo	250 Tons
Upper tween deck layer	1320 Tons
Lower tween deck layer	310 Tons
Hold layer	370 Tons

- A. 1171.5 tons
- B. 1311.0 tons
- C. 1503.0 tons
- D. 1912.5 tons

Correct answer: D

8. You have 10 containers of rig supplies each measuring 10'L by 6'B by 6'H and weighing 1.8 tons each. Each container is stowed on deck. What is the maximum VCG permitted of the remaining cargo if you are carrying rig water and load to maximum capacity? See illustration D037DG below.
- A. 0.94 foot
 - B. 1.36 feet
 - C. 1.78 feet
 - D. 1.96 feet

Correct answer: A

9. Using the information in Section 1, the blue pages, of the Stability Data Reference Book, determine the danger angle for permanent list if the KG is 22.4 feet, and the drafts are: FWD 19'-06", AFT 20'-00".
- A. 12°
 - B. 24°
 - C. 48°
 - D. 52°

Correct answer: B

10. Your drafts are: FWD 23'-03", AFT 27'-01". Use the blue pages of the Stability Data Reference Book to determine the vessels displacement if you are in fresh water.
- A. 12,550 tons
 - B. 12,900 tons
 - C. 13,200 tons
 - D. 13,350 tons

Correct answer: B

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U.S. Department
of Transportation
**United States
Coast Guard**



Commandant
United States Coast Guard

Washington, D.C. 20593-0001
Staff Symbol:
Phone:

16710
13 May 87

Master, M/V SURVEYOR, O.N. 678678

Subj: M/V SURVEYOR
Stability

Dear Sir:

A stability test, supervised by the U.S. Coast Guard, was conducted on the M/V SURVEYOR at New Orleans, Louisiana, on 7 May 1987. On the basis of this test, stability calculations have been performed. Results indicate that the stability of the M/V SURVEYOR, as presently outfitted and equipped, is satisfactory for operation in Ocean Service as indicated on the Certificate of Inspection, provided the following restrictions are strictly observed:

1. A maximum of 78 persons may be carried. In no case shall the number of persons exceed that allowed on the Certificate of Inspection.
2. The drafts as read on the draft marks shall not exceed 6 feet 3 inches forward or 7 feet 1 inch aft. Trim should be minimized. A loadline is not authorized.
3. The height above the main deck of the center of gravity of deck cargo shall not exceed 2.0 feet. Such cargo must be positively secured before leaving protected waters.
4. A maximum of 50 long tons of deck cargo may be carried when no other below deck ballast or cargo is carried. When rig water is carried, a maximum of 35 long tons of deck cargo may be carried, and no other below deck cargo or ballast is permitted.
5. No permanent ballast or other such weights shall be added, removed, altered, and/or relocated without the authorization and supervision of the cognizant Officer in Charge, Marine Inspection.
6. No watertight bulkheads shall be removed or altered without the authorization and supervision of the cognizant Officer in Charge, Marine Inspection.
7. The watertight door in the bulkhead at frame 18 shall be closed and properly dogged at all times when underway except when actually used for transit under safe conditions.

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8. Cross-connections between all tank sets shall be kept closed at all times when underway.
9. Bilges shall be kept pumped to minimum content at all times.
10. Jet fuel may be carried on deck in eight DOT tanks. The total weight of the fuel and tanks shall not exceed 23.16 long tons and the vertical center of gravity shall not exceed 3 feet 6 inches above the deck. Such tanks must be positively secured against shifting in a seaway prior to leaving protected waters. Neither passengers nor other deck cargo shall be carried when such tanks are aboard the vessel.
11. The Master should make every effort to determine the cause of any list of the vessel before taking corrective action.

It shall be the Master's responsibility to maintain the vessel in a satisfactory stability condition at all times.

This temporary stability letter shall be posted under suitable transparent material in the pilothouse of the vessel so that all pages are visible. It supersedes any stability information previously furnished the vessel.

Sincerely,



W. T. DOOR
Lieutenant Commander
U.S. Coast Guard