

U.S.C.G. Merchant Marine Exam
Master/Chief Mate of Unlimited Tonnage
Q104 Deck Safety – Stability Problems
(Sample Examination)

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

1. 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

2. Your sailing drafts are: FWD 21'-08", AFT 22'-04" and the GM is 3.2 feet. What will be the angle of list if the #6 port deep tank (capacity 201 tons, VCG 11.4 feet, and 25.5 feet off the centerline) is filled? (Use the data in Section 1, the blue pages, of the Stability Data Reference Book)
- A. 2°
 - B. 4°
 - C. 6°
 - D. 8°

Correct answer: D

3. The SS AMERICAN MARINER is ready to bunker with drafts of FWD 14'-04", AFT 17'-06". After all bunkers are on board, soundings indicate the tonnages shown in table ST-0180 below. Use the white pages of The Stability Data Reference Book to determine the free surface correction.

ST-0180

DB 1 CL	48.2	DB 6 CL	212.0
DB 1A CL	81.9	DB 7 P	44.6
DB 2 P	71.2	DB 7 S	94.6
DB 2 S	71.2	DT 1 CL	125.3
DB 3 CL	140.6	DT 1A CL	235.6
DB 3 P	55.6	DT 3 P	86.1
DB 3 S	55.6	DT 3 S	86.1
DB 4 CL	224.1	DT 6 P	201.2
DB 4 P	87.0	DT 6 S	201.2
DB 4 S	87.0	DT 7 P	128.8
DB 5 CL	170.4	DT 7 S	128.8

- A. 1.15 feet
- B. 1.25 feet
- C. 1.31 feet
- D. 1.48 feet

Correct answer: D

4. Use the floodable length curve in Section 1, the blue pages, of the Stability Data Reference Book. If the curve represents 45 percent permeability and number 5 hold floods, the vessel will sink if the permeability exceeds what percent?
- A. 66%
 - B. 70%
 - C. 74%
 - D. 79%

Correct answer: A

5. You are loading in a port subject to the summer load line mark and bound for a port subject to the tropical load line mark. You will enter the tropical zone after steaming four days. You will consume 33 tons of fuel, water, and stores per day. The hydrometer reading at the loading pier is 1.006, and the average TPI is 66. What is the minimum freeboard required at the start of the voyage? Reference Table BL-0022 below.

BL-0022

FREEBOARD FROM DECK LINE		LOAD LINE	
Tropical	77 inches	(T)	7 inches above (S)
Summer	84 inches	(S)	*
Winter	91 inches	(W)	7 inches below (S)
Fresh water allowance	8 inches		

- A. 78 inches
- B. 82 inches
- C. 86 inches
- D. 88 inches

Correct answer: A

6. Your drafts are: FWD 24'-09", AFT 27'-02". Use the blue pages of the Stability Data Reference Book to determine the vessels displacement if you are in salt water.
- A. 13,175 tons
 - B. 13,350 tons
 - C. 13,490 tons
 - D. 13,620 tons

Correct answer: D

7. A cargo vessel of 9,000 tons displacement is carrying a slack deep tank of molasses (SG 1.4). The tank measures 20 feet long and 30 feet wide. What will be the reduction in metacentric height due to free surface, with the vessel floating in sea water (SG 1.026)?
- A. .142 ft.
 - B. .177 ft.
 - C. .195 ft.
 - D. .212 ft.

Correct answer: C

8. The SS AMERICAN MARINER has drafts of: FWD 28'-00", AFT 30'-04". Use the white pages of the Stability Data Reference Book to determine the drafts if you ballast the forepeak with 110.8 tons of seawater.
- A. FWD 28'-08.2", AFT 29'-11.6"
 - B. FWD 28'-09.0", AFT 29' 11.0"
 - C. FWD 28'-09.8", AFT 29' 10.4"
 - D. FWD 28'-10.6", AFT 29' 09.8"

Correct answer: C

9. You have 50 containers of ships stores each measuring 6'L by 4'B by 3'H and weighing 0.4 ton 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. 1.50 feet
 - B. 2.25 feet
 - C. 2.66 feet
 - D. 2.91 feet

Correct answer: C

10. 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 seven days. You will consume 38 tons of fuel, water, and stores per day. The hydrometer reading at the loading pier is 1.004, and the average TPI is 72. What is the minimum freeboard required at the start of the voyage? Reference Table BL-0007 below.

BL-0007

FREEBOARD FROM DECK LINE	LOAD LINE		
Tropical	81 inches	(T)	7 inches above (S)
Summer	88 inches	(S)	*
Winter	95 inches	(W)	7 inches below (S)
Fresh water allowance	6 inches		

- A. 94 inches
- B. 92 inches
- C. 85 inches
- D. 90 inches

Correct answer: D

11. The SS AMERICAN MARINER has the liquid load shown in table ST-0098 below. Use the white pages of The Stability Data Reference Book to determine the LCG-FP of the liquid load.

ST-0098

DB 2 P	71.2	DB 5 P	178.0
DB 2 S	71.2	DB 5 S	180.0
DB 3 CL	220.0	DB 6 CL	242.3
DB 3 P	55.6	DB 6 P	87.0
DB 3 S	55.6	DB 6 S	87.0
DB 4 CL	224.1	DB 7 P	94.6
DB 4 P	128.1	DB 7 S	94.6
DB 4 S	128.1	DT 4 P/S	110.0
DB 5 CL	196.2	DT 5 P/S	108.4

- A. 262.3 ft
- B. 264.9 ft
- C. 268.1 ft
- D. 270.3 ft

Correct answer: C

12. The SS AMERICAN MARINER is loaded with the cargo shown in table ST-0005 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-0005

Deck	200 Tons
Upper tween deck layer	2800 Tons
Lower tween deck layer	1000 Tons
Hold layer	4300 Tons

- A. 174 tons
- B. 189 tons
- C. 158 tons
- D. No loading required

Correct answer: C

13. Your vessel's drafts are: FWD 14'-04", AFT 15'-02"; and the KG is 23.2 feet. Use the selected stability curves in the blue pages of the Stability Data Reference Book to determine the angle of list if the center of gravity is shifted 1.0 foot off the centerline.

- A. 9°
- B. 12°
- C. 15°
- D. 17°

Correct answer: B

14. Use the material in Section 1, the blue pages, of the Stability Data Reference Book. If the KG is 24.2 feet, and the drafts are: FWD 22'-04", AFT 23'-00"; at what angle will the vessel lose positive stability?

- A. 72°
- B. 78°
- C. 86°
- D. 92°

Correct answer: B

15. Your vessel's drafts are: FWD 23'-01", AFT 24'-05"; and the KG is 22.8 feet. Use the selected stability curves in the blue pages of the Stability Data Reference Book to determine the remaining righting arm at 30° inclination if the center of gravity is 1.9 feet off the centerline.

- A. 2.3 feet
- B. 0.7 foot
- C. 3.7 feet
- D. 1.4 feet

Correct answer: B

United States Coast Guard National Maritime Center



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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