

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

Master Less than 500-1600 Gross Registered Tons

Q122 Deck Safety – Stability Problems

(Sample Examination)

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

1. 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

2. Which term is given to the upward slope of a vessels bottom from the keel to the bilge?
- A. Rise of floor
  - B. Rake
  - C. Sheer
  - D. Camber

Correct answer: A

3. 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

4. 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 21.2 feet and the drafts are: FWD 27'-11", AFT 28'-07".
- A. 72°
  - B. 19°
  - C. 52°
  - D. 24°

Correct answer: D

5. Your sailing drafts are: FWD 19'-06", AFT 20'-10" and the GM is 3.3 feet. What will be the angle of list if the #2 starboard deep tank (capacity 100 tons, VCG 19.1 feet, and 24 feet off the centerline) is filled? (Use the data in Section 1, the blue pages, of the Stability Data Reference Book)
- A. Less than 1°
  - B. 2°
  - C. 4°
  - D. 6°

Correct answer: C

6. The sailing drafts are: FWD 23'-02", AFT 24'-06" and the GM is 2.8 feet. Use the information in Section 1, the blue pages, of the Stability Data Reference Book to determine the available righting arm at 30° inclination.
- A. 1.3 feet
  - B. 2.5 feet
  - C. 3.2 feet
  - D. 3.7 feet

Correct answer: B

7. The SS AMERICAN MARINER is ready to bunker with drafts of FWD 11'-01", AFT 15'-01". After all bunkers are on board, soundings indicate the tonnages shown in table ST-0086 below. Use the white pages of The Stability Data Reference Book to determine the free surface correction.

**ST-0086**

|          |       |          |       |
|----------|-------|----------|-------|
| DB 1 CL  | 48.2  | DB 6 CL  | 242.3 |
| DB 1A CL | 81.9  | DB 7 P   | 94.6  |
| DB 2 P   | 71.2  | DB 7 S   | 94.6  |
| DB 2 S   | 71.2  | DT 1 CL  | 125.3 |
| DB 3 CL  | 227.6 | DT 1A CL | 257.6 |
| DB 3 P   | 55.6  | DT 2 P   | 80.0  |
| DB 3 S   | 55.6  | DT 2 S   | 80.0  |
| DB 4 CL  | 224.1 | DT 6 P   | 201.2 |
| DB 4 P   | 128.1 | DT 6 S   | 201.2 |
| DB 4 S   | 128.1 | DT 7 P   | 128.8 |
|          |       | DT 7 S   | 128.8 |

- A. 0.68 foot
- B. 0.85 foot
- C. 0.97 foot
- D. 1.30 feet

Correct answer: A

8. Your vessel measures 122 feet long by 18 feet in beam. If the natural rolling period at a draft of 6'-09" is 5 seconds, what is the GM?
- A. 2.1 feet
  - B. 2.9 feet
  - C. 1.4 feet
  - D. 2.5 feet

Correct answer: D

9. The SS AMERICAN MARINER is ready to sail with the load shown in table ST-0078 below. Use the white pages of The Stability Data Reference Book to determine the available GM.

**ST-0078**

| <b>ITEM</b>  | <b>TONS</b> | <b>KG</b> |
|--|-------------|-----------|
| CREW and STORES  | 50          | 43.7      |
| LUBE OIL   | 13          | 25.8      |
| F.O. & SALT WATER  | 2024        | 7.5       |
| FRESH WATER  | 160         | 21.0      |
| DRY CARGO  | 7090        | 27.4      |
| REEFER CARGO   | 170         | 29.2      |
| DECK CARGO   | 155         | 55.0      |
| <b>TOTAL FREE SURFACE MOMENTS<br/>FOR ALL LIQUIDS ON BOARD</b> |             | 15538     |

- A. Available GM 3.1 ft
- B. Available GM 3.6 ft
- C. Available GM 3.8 ft
- D. Available GM 3.3 ft

Correct answer: A

10. You have 590 tons of below deck tonnage. There is no liquid mud aboard. If you have 84 tons of cargo above deck with a VCG above the deck of 2.7 feet, what is the maximum allowed VCG of the remainder of the deck cargo that is permitted? See illustration D036DG below.

- A. 2.54 feet
- B. 2.85 feet
- C. 3.11 feet
- D. 3.55 feet

Correct answer: C

# United States Coast Guard National Maritime Center



## D036DG Part 1 of 3

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



Commandant  
United States Coast Guard

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

16710  
8 Apr 87

Master, M/V HUDSON, O.N. 666666

Subj: M/V HUDSON  
Stability

Dear Sir:

A stability test, supervised by the U.S. Coast Guard, was conducted on the M/V HUDSON at San Diego, California on 08 April 1987. On the basis of this test, stability calculations have been performed. Results indicate that the stability of the M/V HUDSON, 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. The vessel shall only be loaded according to the instructions on the attached LOADING DIAGRAM bearing U.S. Coast Guard approval stamp dated 8 April 1986.

b. Drilling fluids may be carried. The maximum specific gravity of the fluids shall not exceed 2.60.

c. The vessel may engage in towing operations when loaded in accordance with the attached LOADING DIAGRAM.

2. The height above the main deck of the center of gravity of the deck cargo shall not exceed the value shown on the LOADING DIAGRAM (3.0 feet). Such cargo must be positively secured against shifting prior to leaving protected waters.

3. Permanent ballast, in the form of 64.4 long tons of high density fluids (sg. = 2.87), is to be maintained in the after peak tank. No permanent ballast shall be added, removed, altered and/or relocated without the authorization and supervision of the cognizant Officer in Charge, Marine Inspection.

4. The maximum summer load line draft is 13 feet 8 3/8 inches. Trim shall be minimized and shall always result in a freeboard of at least 22 inches at the stern.

5. No more than one centerline or P/S pair of the following tanks may be partially filled at any one time: fuel oil, lube oil, potable water, ballast/cargo water, fuel oil day tanks, drilling fluid. Cross-connections between all port and starboard tank pairs shall be kept closed at all times when underway.



**D036DG**  
**Part 2 of 3**

6. Main deck hatches and weather doors to the forecastle and machinery spaces shall be kept closed and fully secured at all times when underway, except when actually used for transit under safe conditions.

7. Main deck freeing ports shall be maintained operable and completely unobstructed at all times.

8. Bilges shall be kept pumped to minimum content at all times.

9. Suitable tables or curves for determining the capacities of full or partially full tanks shall be maintained aboard the vessel.

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

Sincerely,

A. B. SEA  
Lieutenant Commander  
U.S. Coast Guard

Attachment: LOADING DIAGRAM for the subject vessel bearing U.S. Coast Guard approval stamp dated 8 April 1987



## D036DG Part 3 of 3

