Deck General – Safety

Ship Construction And Repair

This Study Guide Generated For

Preview Only. Download the

complete studyguide Here.

https://cgexams.seasources.net

DO NOT DISTRIBUTE

In illustration D041DG below, which of the following is the symbol for the reference from which transverse measurements are made?
5

Illustrations: D041DG_WM_071918, STRUCTURALMEMBER_WM
See REF025

In illustration D041DG below, which of the following is the symbol for displacement?
1

Illustrations: D041DG_WM_071918, STRUCTURALMEMBER_WM
See REF025

In illustration D041DG below, what does symbol 1 refer to?
displacement

Illustrations: D041DG_WM_071918, STRUCTURALMEMBER_WM
See REF025

In illustration D041DG below, which symbol is the reference from which the height of the center of gravity is measured?
2

Illustrations: D041DG_WM_071918, STRUCTURALMEMBER_WM
See REF025

In the illustration D041DG below, what does symbol 2 represent?
baseline

Illustrations: D041DG_WM_071918, STRUCTURALMEMBER_WM
See REF025

In illustration D041DG below, which is the symbol for amidships?
3

Illustrations: D041DG_WM_071918, STRUCTURALMEMBER_WM
See REF025

In the illustration D041DG below, what does symbol 3 represent?
amidships

Illustrations: D041DG_WM_071918, STRUCTURALMEMBER_WM
See REF025

In illustration D041DG below, which is the symbol for the vertical plane midway between the fore and aft perpendiculars?
3

Illustrations: D041DG_WM_071918, STRUCTURALMEMBER_WM
See REF025

In the illustration D041DG below, what does symbol 5 represent?
centerline

Illustrations: D041DG_WM_071918, STRUCTURALMEMBER_WM
See REF025

In illustration D041DG below, which of the following is the symbol for the reference from which transverse measurements are made?
5

Illustrations: D041DG_WM_071918, STRUCTURALMEMBER_WM
See REF025

In illustration D041DG below, which of the following is the symbol for displacement?
1

Illustrations: D041DG_WM_071918, STRUCTURALMEMBER_WM
See REF025

In illustration D041DG below, what does symbol 1 refer to?
displacement

Illustrations: D041DG_WM_071918, STRUCTURALMEMBER_WM
See REF025

In illustration D041DG below, which symbol is the reference from which the height of the center of gravity is measured?
2

Illustrations: D041DG_WM_071918, STRUCTURALMEMBER_WM
See REF025

In the illustration D041DG below, what does symbol 2 represent?
baseline

Illustrations: D041DG_WM_071918, STRUCTURALMEMBER_WM
See REF025

In illustration D041DG below, which is the symbol for amidships?
3

Illustrations: D041DG_WM_071918, STRUCTURALMEMBER_WM
See REF025

In the illustration D041DG below, what does symbol 3 represent?
amidships

Illustrations: D041DG_WM_071918, STRUCTURALMEMBER_WM
See REF025

In illustration D041DG below, which is the symbol for the vertical plane midway between the fore and aft perpendiculars?
3

Illustrations: D041DG_WM_071918, STRUCTURALMEMBER_WM
See REF025

In the illustration D041DG below, what does symbol 5 represent?
centerline

Illustrations: D041DG_WM_071918, STRUCTURALMEMBER_WM
See REF025

What welding pattern is NOT used to permanently attach a stiffener to a plate?
Tack

Illustrations: WELD FAULT
See REF475

The welds used to attach stiffeners to a plate are known as _____.
fillet welds

Illustrations: WELD FAULT
See REF475

The welds used to join shell plates in flush construction are known as _____.
butt welds

Illustrations: WELD FAULT
See REF475

Which type of weld testing can be used to detect internal flaws?
Radiographic

Illustrations: WELD FAULT
See REF476

Which type of weld testing can be used to detect internal flaws?
Ultrasonic

Illustrations: WELD FAULT
See REF476

Ultrasonic testing is used to determine the thickness of a vessel's shell plating and to _____.
test welds for subsurface defects

Illustrations: WELD FAULT

The type of welding employed in shipyards is primarily _____.
electric arc

Illustrations: WELD FAULT
See REF025

Which weld fault can only be detected by a method that examines the internal structure of a weld?
Lack of penetration

Illustrations: WELD FAULT
See REF475

Sometimes it is desirable to connect a member both by riveting and welding. Which statement is TRUE concerning this procedure?
The welding must be completed before the riveting commences.

Illustrations: WELD FAULT
See REF475

A welded joint's effectiveness is considered _____.
100 (%)

Illustrations: WELD FAULT
See REF475

The term "pintle" and "gudgeon" are associated with the _____.
rudder

Illustrations: PINTLE_AND_GUDGEON_RUDDER_SYSTEM
See REF462

A thirty pound plate would be _____.
3/4" thick

Illustrations: STEEL WT SQ FT CHART

The deck beam brackets of a transversely framed vessel resist _____.
racking stresses

Illustrations: RACKING STRESSES
See REF025

Which statement concerning solid floors is TRUE?
They may have lightening, limber, or air holes cut into them.

Illustrations: STRUCTURALMEMBER
See REF444

The letter I indicates the keel. Which of the following plates is NOT part of the keel?
Longitudinal girder

Illustrations: D033DG_WM_080318, STRUCTURALMEMBER
See REF025

In ship construction, frame spacing is _____.
reduced at the bow and stern

Illustrations: STRUCTURALMEMBER
See REF025

Why are most break bulk vessels built with the transverse framing system rather than the longitudinal system?
The deep web frames interfere with the stowage of break bulk cargo.

Illustrations: STRUCTURALMEMBER
See REF444

In illustration D033DG below, what is the structural member indicated by the letter K?
floor

Illustrations: D033DG_WM_080318, STRUCTURALMEMBER
See REF025

In illustration D033DG below, which letter indicates a butt?
D

Illustrations: D033DG_WM_080318, STRUCTURALMEMBER
See REF025

The area indicated by the letter G is known as the _____.
turn of the bilge

Illustrations: D033DG_WM_080318, STRUCTURALMEMBER
See REF025

A seam is indicated by which letter in illustration D033DG?
E

Illustrations: D033DG_WM_080318, STRUCTURALMEMBER
See REF025

Transverse frames are more widely spaced on a ship that is designed with the _____.
longitudinal system of framing

Illustrations: STRUCTURALMEMBER
See REF025

The stringer plate is represented by which letter?
A

Illustrations: D033DG_WM_080318, STRUCTURALMEMBER
See REF025

In illustration D033DG below, what is the structural member indicated by the letter L?
longitudinal

Illustrations: D033DG_WM_080318, STRUCTURALMEMBER
See REF025

In illustration D033DG below, the lower seam of the strake indicated by the letter B is sometimes riveted. Why is this done?
serve as a crack arrestor and prevent hull girder failure

Illustrations: D033DG_WM_080318, STRUCTURALMEMBER
See REF025

The joint indicated by letter D is a _____.
butt

Illustrations: D033DG_WM_080318, STRUCTURALMEMBER
See REF025

The space indicated by the letter J is known as the _____.
double bottom

Illustrations: D033DG_WM_080318, STRUCTURALMEMBER
See REF025

The terms "cant frame" and "counter" are associated with the vessel's _____.
stern

Illustrations: STRUCTURALMEMBER
See REF444

In illustration D033DG below, which letter indicates a longitudinal?
L

Illustrations: D033DG_WM_080318, STRUCTURALMEMBER
See REF025

In illustration D033DG below, what is the structural member indicated by the letter F?
pillar

Illustrations: D033DG_WM_080318, STRUCTURALMEMBER
See REF025

A butt is indicated by which letter?
D

Illustrations: D033DG_WM_080318, STRUCTURALMEMBER
See REF025

The structural member indicated by the letter K was fitted in segments between continuous longitudinals. It is known as which type of floor?
Intercostal

Illustrations: D033DG_WM_080318, STRUCTURALMEMBER
See REF025

In illustration D033DG below, what does the letter "M" indicate?
web frame

Illustrations: D033DG_WM_080318, STRUCTURALMEMBER
See REF025

In illustration D033DG below, the stringer plate is represented by which letter?
A

Illustrations: D033DG_WM_080318, STRUCTURALMEMBER
See REF025

The structural member indicated by the letter L is a _____.
longitudinal

Illustrations: D033DG_WM_080318, STRUCTURALMEMBER
See REF025

The garboard strake is indicated by which letter?
H

Illustrations: D033DG_WM_080318, STRUCTURALMEMBER
See REF025

The structural member indicated by the letter K is a _____.
floor

Illustrations: D033DG_WM_080318, STRUCTURALMEMBER
See REF025

In illustration D033DG below, what is the structural member indicated by the letter I?
keel

Illustrations: D033DG_WM_080318, STRUCTURALMEMBER
See REF025

In illustration D033DG below, which letter indicates the garboard strake?
H

Illustrations: D033DG_WM_080318, STRUCTURALMEMBER
See REF025

In illustration D033DG below, what is the run of plating labeled A known as?
stringer plate

Illustrations: D033DG_WM_080318, STRUCTURALMEMBER
See REF025

The letter M indicates a(n) _____.
web frame

Illustrations: D033DG_WM_080318, STRUCTURALMEMBER
See REF025

The lower seam of the strake indicated by the letter B is sometimes riveted. This is done to _____.
serve as a crack arrestor and prevent hull girder failure

Illustrations: D033DG_WM_080318, STRUCTURALMEMBER
See REF025

The structural member indicated by the letter F is known as a(n) _____.
pillar

Illustrations: D033DG_WM_080318, STRUCTURALMEMBER
See REF025

The plating indicated by the letter N is known as the _____.
inner bottom

Illustrations: D033DG_WM_080318, STRUCTURALMEMBER
See REF025

In illustration D033DG below, which letter indicates a seam?
E

Illustrations: D033DG_WM_080318, STRUCTURALMEMBER
See REF025

In illustration D033DG below, what is the strake of shell plating indicated by letter H known as?
garboard strake

Illustrations: D033DG_WM_080318, STRUCTURALMEMBER
See REF025

In illustration D033DG below, what is a wooden deck installed on top of the plating lettered N known as?
ceiling

Illustrations: D033DG_WM_080318, STRUCTURALMEMBER
See REF025

Which is an advantage of using watertight longitudinal divisions in double bottom tanks?
Cuts down free surface effect

Illustrations: STRUCTURALMEMBER
See REF444

The run of plating labeled A is known as the _____.
stringer plate

Illustrations: D033DG_WM_080318, STRUCTURALMEMBER
See REF025

In ship construction, keel scantlings should be the greatest _____.
amidships

Illustrations: STRUCTURALMEMBER
See REF453

The floors in a vessel's hull structure are kept from tripping, or folding over, by _____.
bottom longitudinals

Illustrations: STRUCTURALMEMBER
See REF025

The "margin plate" is the _____.
outboard strake of plating on each side of an inner bottom

Illustrations: STRUCTURALMEMBER
See REF025

In illustration D033DG below, what is the area indicated by the letter G is known as?
turn of the bilge

Illustrations: D033DG_WM_080318, STRUCTURALMEMBER
See REF025

In illustration D033DG below, the structural member indicated by the letter K was fitted in segments between continuous longitudinals. It is known as which type of floor?
Intercostal

Illustrations: D033DG_WM_080318, STRUCTURALMEMBER
See REF025

In illustration D033DG below, what is the plating indicated by the letter N known as?
inner bottom

Illustrations: D033DG_WM_080318, STRUCTURALMEMBER
See REF025

Aboard ship, vertical flat plates running transversely and connecting the vertical keel to the margin plates are called _____.
floors

Illustrations: STRUCTURALMEMBER
See REF025

The structural member indicated by the letter I is the _____.
keel

Illustrations: D033DG_WM_080318, STRUCTURALMEMBER
See REF025

The terms "ceiling" and "margin plate" are associated with the _____.
tank top

Illustrations: STRUCTURALMEMBER
See REF444

Which statement is TRUE concerning protection of double bottom tanks against excessive pressure?
The total area of the vents or the overflow shall be at least 125% of the area of the fill line.

Illustrations: STRUCTURALMEMBER
See REF444

A vessel having continuous closely spaced transverse strength members is _____.
transversely framed

Illustrations: STRUCTURALMEMBER
See REF454

In illustration D033DG below, what is the space indicated by the letter J known as?
double bottom

Illustrations: D033DG_WM_080318, STRUCTURALMEMBER
See REF025

In illustration D033DG below, what is the joint indicated by letter D?
butt

Illustrations: D033DG_WM_080318, STRUCTURALMEMBER
See REF025

In illustration D033DG below, what is the structural member indicated by the letter K?
floor

Illustrations: D033DG_WM_080318, STRUCTURALMEMBER
See REF025

In illustration D033DG below, which letter indicates a butt?
D

Illustrations: D033DG_WM_080318, STRUCTURALMEMBER
See REF025

The area indicated by the letter G is known as the _____.
turn of the bilge

Illustrations: D033DG_WM_080318, STRUCTURALMEMBER
See REF025

A seam is indicated by which letter in illustration D033DG?
E

Illustrations: D033DG_WM_080318, STRUCTURALMEMBER
See REF025

The stringer plate is represented by which letter?
A

Illustrations: D033DG_WM_080318, STRUCTURALMEMBER
See REF025

In illustration D033DG below, what is the structural member indicated by the letter L?
longitudinal

Illustrations: D033DG_WM_080318, STRUCTURALMEMBER
See REF025

In illustration D033DG below, the lower seam of the strake indicated by the letter B is sometimes riveted. Why is this done?
serve as a crack arrestor and prevent hull girder failure

Illustrations: D033DG_WM_080318, STRUCTURALMEMBER
See REF025

The joint indicated by letter D is a _____.
butt

Illustrations: D033DG_WM_080318, STRUCTURALMEMBER
See REF025

The space indicated by the letter J is known as the _____.
double bottom

Illustrations: D033DG_WM_080318, STRUCTURALMEMBER
See REF025

In illustration D033DG below, which letter indicates a longitudinal?
L

Illustrations: D033DG_WM_080318, STRUCTURALMEMBER
See REF025

In illustration D033DG below, what is the structural member indicated by the letter F?
pillar

Illustrations: D033DG_WM_080318, STRUCTURALMEMBER
See REF025

A butt is indicated by which letter?
D

Illustrations: D033DG_WM_080318, STRUCTURALMEMBER
See REF025

The structural member indicated by the letter K was fitted in segments between continuous longitudinals. It is known as which type of floor?
Intercostal

Illustrations: D033DG_WM_080318, STRUCTURALMEMBER
See REF025

In illustration D033DG below, what does the letter "M" indicate?
web frame

Illustrations: D033DG_WM_080318, STRUCTURALMEMBER
See REF025

In illustration D033DG below, the stringer plate is represented by which letter?
A

Illustrations: D033DG_WM_080318, STRUCTURALMEMBER
See REF025

The structural member indicated by the letter L is a _____.
longitudinal

Illustrations: D033DG_WM_080318, STRUCTURALMEMBER
See REF025

The garboard strake is indicated by which letter?
H

Illustrations: D033DG_WM_080318, STRUCTURALMEMBER
See REF025

The structural member indicated by the letter K is a _____.
floor

Illustrations: D033DG_WM_080318, STRUCTURALMEMBER
See REF025

In illustration D033DG below, what is the structural member indicated by the letter I?
keel

Illustrations: D033DG_WM_080318, STRUCTURALMEMBER
See REF025

In illustration D033DG below, which letter indicates the garboard strake?
H

Illustrations: D033DG_WM_080318, STRUCTURALMEMBER
See REF025

In illustration D033DG below, what is the run of plating labeled A known as?
stringer plate

Illustrations: D033DG_WM_080318, STRUCTURALMEMBER
See REF025

The letter M indicates a(n) _____.
web frame

Illustrations: D033DG_WM_080318, STRUCTURALMEMBER
See REF025

The lower seam of the strake indicated by the letter B is sometimes riveted. This is done to _____.
serve as a crack arrestor and prevent hull girder failure

Illustrations: D033DG_WM_080318, STRUCTURALMEMBER
See REF025

The structural member indicated by the letter F is known as a(n) _____.
pillar

Illustrations: D033DG_WM_080318, STRUCTURALMEMBER
See REF025

The plating indicated by the letter N is known as the _____.
inner bottom

Illustrations: D033DG_WM_080318, STRUCTURALMEMBER
See REF025

In illustration D033DG below, which letter indicates a seam?
E

Illustrations: D033DG_WM_080318, STRUCTURALMEMBER
See REF025

In illustration D033DG below, what is the strake of shell plating indicated by letter H known as?
garboard strake

Illustrations: D033DG_WM_080318, STRUCTURALMEMBER
See REF025

In illustration D033DG below, what is a wooden deck installed on top of the plating lettered N known as?
ceiling

Illustrations: D033DG_WM_080318, STRUCTURALMEMBER
See REF025

line may also have a sheer. The amount by which the height of the weather deck at the after or forward perpendicular exceeds that at its lowest point. FLARE : The spreading out from a central vertical plane of the body of a ship with increasing rapidity as the section rises from the water line to the rail. COUNTER : That part of a ship's stern which overhangs the stern post, usually that part above the water line. FREEING PORTS : Holes in the lower portion of a bulwark, which allow deck wash to drain off into the sea. Some freeing ports have swinging gates which allow water to drain off but which are automatically closed by sea-water pressure.

REF447
Hull members that run athwartship (from one side to the other) are called "transverse." Those that run from the bow to the stern are called "longitudinal." A ships inner bottom forms the tank top in the engineroom. The double bottom is the space or tank between the inner bottom and the skin or the hull. Vertical transverse members in the double bottom are called floors. ceiling The inside planking or plating in the hold of a merchant vessel, laid across the floors and carried up the sides of the holds to the level of the beams. CEILING : A term applied to the planking with which the inside of a vessel is sheathed. Also applied to the sheet metal or wood sheathing in quarters and storerooms. Stringer: A term applied to a fore-and-aft girder running along the side of a ship and also to the outboard strake of plating on any deck. The side pieces of a ladder or staircase into which the treads and risers are fastened. Stringer Plates: A term applied to the outboard plates on any deck, or to the plates attached to the top flanges of a tier of beams at the side of a vessel. Stiffener: An angle bar, T-bar, channel, etc., used to stiffen plating of a bulkhead, etc. A cofferdam is a void space between two tanks that prevents one tank from leaking directly into the other. TUMBLE HOME: The decreasing of a vessel's beam above the waterline as it approaches the rail. Opposite of flare. RUN: The underwater portion of a vessel aft of the midship section or flat of the bottom. That portion of the after hull that tapers to the stern post. MIDDLE BODY: That portion of the ship adjacent to the midship section. When it has a uniform cross section throughout, its length its waterlines being parallel to the centerline, it is called the parallel middle body. ENTRANCE: The forward underwater portion of a vessel at or near the bow. The angle formed between the center line of the ship and the tangent to the designed waterline is called the angle of entrance. CAMBER, ROUND OF BEAM : The weather decks of ships are rounded up or arched in an athwartship direction for the purpose of draining any water that may fall on them to the sides of the ship where it can be led overboard through scuppers. The arching or rounding up is called the camber or round of the beam and is expressed in inches in connection with the greatest molded breadth of the ship in feet, thus, "the main deck has a camber of 10 inches in 40 feet." It is measured at the center line of the ship at the greatest molded breadth and is the distance from the chord to the top of the arch. DEADRISE : The angle which the straight portion of the bottom of the floor of the midship section makes with the base line. It is expressed by the number of inches rise above the base line in the half-beam of the vessel. SHEER : The longitudinal curve of a vessel's rails, decks, etc. the usual reference being to the ship's side; however, in the case of a deck having a camber, its center line may also have a sheer. The amount by which the height of the weather deck at the after or forward perpendicular exceeds that at its lowest point. FLARE : The spreading out from a central vertical plane of the body of a ship with increasing rapidity as the section rises from the water line to the rail. COUNTER : That part of a ship's stern which overhangs the stern post, usually that part above the water line. FREEING PORTS : Holes in the lower portion of a bulwark, which allow deck wash to drain off into the sea. Some freeing ports have swinging gates which allow water to drain off but which are automatically closed by sea-water pressure.

REF448
170.055 Definitions concerning a vessel.

REF449
SC

REF450
46 CFR 56 46 CFR 61.20-5

REF451
As the vessel begins to settle on the blocks, the force acting down on the blocks has the net effect of removing weight from the keel. This causes the center of gravity to rise, and if it rises above the metacenter, the vessel may start to list.

REF452
A ships inner bottom forms the tank top in the engineroom. The double bottom is the space or tank between the inner bottom and the skin or the hull. Vertical transverse members in the double bottom are called floors.

REF453
scantlings The dimensions of a ship's principle timbers, or the timbers themselves.

REF454
TRANSVERSE At right angles to the ship's fore-and-aft center line. TRANSVERSE FRAMES Vertical athwartship members forming the ribs.

REF455
Stiffener: An angle bar, T-bar, channel, etc., used to stiffen plating of a bulkhead, etc.

REF456
In shipbuilding, the scantling refers to the collective dimensions of the framing (apart from the keel) to which planks or plates are attached to form the hull. The word is most often used in the plural to describe how much structural strength in the form of girders, I-beams, etc. is in a given section. The scantling length refers to the structural length of a ship. In shipping, a "full scantling vessel" is understood to be a geared ship, that can reach all parts of its own cargo spaces with its own gear.

REF457
Hull members that run athwartship (from one side to the other) are called "transverse." Those that run from the bow to the stern are called "longitudinal." A ships inner bottom forms the tank top in the engineroom. The double bottom is the space or tank between the inner bottom and the skin or the hull. Vertical transverse members in the double bottom are called floors. Stringer: A term applied to a fore-and-aft girder running along the side of a ship and also to the outboard strake of plating on any deck. The side pieces of a ladder or staircase into which the treads and risers are fastened. Stringer Plates: A term applied to the outboard plates on any deck, or to the plates attached to the top flanges of a tier of beams at the side of a vessel. Stiffener: An angle bar, T-bar, channel, etc., used to stiffen plating of a bulkhead, etc. A cofferdam is a void space between two tanks that prevents one tank from leaking directly into the other. TUMBLE HOME: The decreasing of a vessel's beam above the waterline as it approaches the rail. Opposite of flare. RUN: The underwater portion of a vessel aft of the midship section or flat of the bottom. That portion of the after hull that tapers to the stern post. MIDDLE BODY: That portion of the ship adjacent to the midship section. When it has a uniform cross section throughout, its length its waterlines being parallel to the centerline, it is called the parallel middle body. ENTRANCE: The forward underwater portion of a vessel at or near the bow. The angle formed between the center line of the ship and the tangent to the designed waterline is called the angle of entrance. CAMBER, ROUND OF BEAM : The weather decks of ships are rounded up or arched in an athwartship direction for the purpose of draining any water that may fall on them to the sides of the ship where it can be led overboard through scuppers. The arching or rounding up is called the camber or round of the beam and is expressed in inches in connection with the greatest molded breadth of the ship in feet, thus, "the main deck has a camber of 10 inches in 40 feet." It is measured at the center line of the ship at the greatest molded breadth and is the distance from the chord to the top of the arch. DEADRISE : The angle which the straight portion of the bottom of the floor of the midship section makes with the base line. It is expressed by the number of inches rise above the base line in the half-beam of the vessel. SHEER : The longitudinal curve of a vessel's rails, decks, etc. the usual reference being to the ship's side; however, in the case of a deck having a camber, its center line may also have a sheer. The amount by which the height of the weather deck at the after or forward perpendicular exceeds that at its lowest point. FLARE : The spreading out from a central vertical plane of the body of a ship with increasing rapidity as the section rises from the water line to the rail. COUNTER : That part of a ship's stern which overhangs the stern post, usually that part above the water line. FREEING PORTS : Holes in the lower portion of a bulwark, which allow deck wash to drain off into the sea. Some freeing ports have swinging gates which allow water to drain off but which are automatically closed by sea-water pressure. BUTT : That end or edge of a plate or timber where it comes squarely against another piece, or, the joint thus formed. The long edge of a plate is called the edge and the short edge is called the end.

REF458
A term applied to a plate taking the end of a drop strake or a plate combining two strakes into one. Stealer plates occur at the bow and stern, where the narrowing girth compels a reduction in the number of strakes.

REF459
furnaced plate: A plate that requires heating in order to mould it into shape. The most common types are the oxter and boss plates.

REF460
The purpose of bilge keels (i.e., "rolling chocks") is to reduce the amplitude (i.e., amount) of roll.

REF461

Hull members that run athwartship (from one side to the other) are called "transverse." Those that run from the bow to the stern are called "longitudinal." A ships inner bottom forms the tank top in the engineroom. The double bottom is the space or tank between the inner bottom and the skin or the hull. Vertical transverse members in the double bottom are called floors. Stringer: A term applied to a fore-and-aft girder running along the side of a ship and also to the outboard strake of plating on any deck. The side pieces of a ladder or staircase into which the treads and risers are fastened. Stringer Plates: A term applied to the outboard plates on any deck, or to the plates attached to the top flanges of a tier of beams at the side of a vessel. Stiffener: An angle bar, T-bar, channel, etc., used to stiffen plating of a bulkhead, etc. A cofferdam is a void space between two tanks that prevents one tank from leaking directly into the other. TUMBLE HOME: The decreasing of a vessel's beam above the waterline as it approaches the rail. Opposite of flare. RUN: The underwater portion of a vessel aft of the midship section or flat of the bottom. That portion of the after hull that tapers to the stern post. MIDDLE BODY: That portion of the ship adjacent to the midship section. When it has a uniform cross section throughout, its length its waterlines being parallel to the centerline, it is called the parallel middle body. ENTRANCE: The forward underwater portion of a vessel at or near the bow. The angle formed between the center line of the ship and the tangent to the designed waterline is called the angle of entrance. CAMBER, ROUND OF BEAM : The weather decks of ships are rounded up or arched in an athwartship direction for the purpose of draining any water that may fall on them to the sides of the ship where it can be led overboard through scuppers. The arching or rounding up is called the camber or round of the beam and is expressed in inches in connection with the greatest molded breadth of the ship in feet, thus, "the main deck has a camber of 10 inches in 40 feet." It is measured at the center line of the ship at the greatest molded breadth and is the distance from the chord to the top of the arch. DEADRISE : The angle which the straight portion of the bottom of the floor of the midship section makes with the base line. It is expressed by the number of inches rise above the base line in the half-beam of the vessel. SHEER : The longitudinal curve of a vessel's rails, decks, etc. the usual reference being to the ship's side; however, in the case of a deck having a camber, its center line may also have a sheer. The amount by which the height of the weather deck at the after or forward perpendicular exceeds that at its lowest point. FLARE : The spreading out from a central vertical plane of the body of a ship with increasing rapidity as the section rises from the water line to the rail. COUNTER : That part of a ship's stern which overhangs the stern post, usually that part above the water line. FREEING PORTS : Holes in the lower portion of a bulwark, which allow deck wash to drain off into the sea. Some freeing ports have swinging gates which allow water to drain off but which are automatically closed by sea-water pressure. PLATING A ship is structurally a box girder. Shell plating forms the sides and bottom of the box girder, and the weather deck forms the top. The point where the weather deck (main and forecastle decks) and the side plating meet is called the deck edge or gunwale (pronounced gunnels). The location where the bottom plating and the side plating meet is called the bilge. Usually the bottom is rounded into the side of the ship to some degree; this rounding is called the turn of the bilge. Most merchant ships, aircraft carriers, and auxiliary ships have a boxlike midship section with vertical sides and a flat bottom, as shown in figure 17-1. High-speed ships such as destroyers and cruisers, however, have rising bottoms and broad, rounded bilges. This shape is partially, although not entirely, responsible for the high speed of these ships. Individual shell plates are usually rectangular in shape; the short sides are referred to as the ends, and the long sides are called edges. End joints are known as butts and edge joints as seams. Plates are joined together at the butts to form long strips of plating running lengthwise; these fore-and-aft rows of plating are called strakes. The uppermost side strake, at the gunwale, is known as the sheer strake. It is thicker than most strakes since it must withstand high stresses at these corners as the ship bends over wave crests. The outer weather-deck strake, known as the stringer strake, also contributes to the strength of the hull. The shell plating, together with the weather deck, forms the watertight envelope of the ship. The internal structural members of the hull reinforce the watertight capacity of the hull.

REF462
Pintles and Gudgeons comprise the hinging mechanism on outboard-mounted Rudders. Pintles always incorporate a Pin, Gudgeons always have a hole for a Pin, either may be attached to the rudder or to the Transom. In standard configuration, Pintles are attached to the Rudder, and Gudgeons are attached to the Transom.

REF463
FREEING PORT: A rectangular or oval opening in the bulwark just above the deck. These ports are necessary when seas break over the deck so that the ship can clear itself quickly. As these openings are about the size of a manhole, rods or bars are generally fitted across them. Flap doors are sometimes fitted on the outside hinging outboard.

REF464
BULWARK: A term applied to the strake of shell plating or the side planking above a weather deck. It helps to keep the deck dry and also serves as a guard against losing deck cargo or men overboard. Where bulwarks are fitted it is customary to provide openings in them which are called freeing ports, to allow the water that breaks over to clear itself. Bulwarks interfere with the rapid handling of cargo as care must always be taken to hoist everything clear of its top.

REF465
Hull members that run athwartship (from one side to the other) are called "transverse." Those that run from the bow to the stern are called "longitudinal." A ships inner bottom forms the tank top in the engineroom. The double bottom is the space or tank between the inner bottom and the skin or the hull. Vertical transverse members in the double bottom are called floors. Stringer: A term applied to a fore-and-aft girder running along the side of a ship and also to the outboard strake of plating on any deck. The side pieces of a ladder or staircase into which the treads and risers are fastened. Stringer Plates: A term applied to the outboard plates on any deck, or to the plates attached to the top flanges of a tier of beams at the side of a vessel. Stiffener: An angle bar, T-bar, channel, etc., used to stiffen plating of a bulkhead, etc. A cofferdam is a void space between two tanks that prevents one tank from leaking directly into the other. TUMBLE HOME: The decreasing of a vessel's beam above the waterline as it approaches the rail. Opposite of flare. RUN: The underwater portion of a vessel aft of the midship section or flat of the bottom. That portion of the after hull that tapers to the stern post. MIDDLE BODY: That portion of the ship adjacent to the midship section. When it has a uniform cross section throughout, its length its waterlines being parallel to the centerline, it is called the parallel middle body. ENTRANCE: The forward underwater portion of a vessel at or near the bow. The angle formed between the center line of the ship and the tangent to the designed waterline is called the angle of entrance. CAMBER, ROUND OF BEAM : The weather decks of ships are rounded up or arched in an athwartship direction for the purpose of draining any water that may fall on them to the sides of the ship where it can be led overboard through scuppers. The arching or rounding up is called the camber or round of the beam and is expressed in inches in connection with the greatest molded breadth of the ship in feet, thus, "the main deck has a camber of 10 inches in 40 feet." It is measured at the center line of the ship at the greatest molded breadth and is the distance from the chord to the top of the arch. DEADRISE : The angle which the straight portion of the bottom of the floor of the midship section makes with the base line. It is expressed by the number of inches rise above the base line in the half-beam of the vessel. SHEER : The longitudinal curve of a vessel's rails, decks, etc. the usual reference being to the ship's side; however, in the case of a deck having a camber, its center line may also have a sheer. The amount by which the height of the weather deck at the after or forward perpendicular exceeds that at its lowest point. FLARE : The spreading out from a central vertical plane of the body of a ship with increasing rapidity as the section rises from the water line to the rail. COUNTER : That part of a ship's stern which overhangs the stern post, usually that part above the water line. FREEING PORTS : Holes in the lower portion of a bulwark, which allow deck wash to drain off into the sea. Some freeing ports have swinging gates which allow water to drain off but which are automatically closed by sea-water pressure. Limber Holes: Drainage holes in the bilge timbers of a vessel, allowing water to run to a low point for pumping out.

REF466
Limber Holes: Drainage holes in the bilge timbers of a vessel, allowing water to run to a low point for pumping out. Hull members that run athwartship (from one side to the other) are called "transverse." Those that run from the bow to the stern are called "longitudinal." A ships inner bottom forms the tank top in the engineroom. The double bottom is the space or tank between the inner bottom and the skin or the hull. Vertical transverse members in the double bottom are called floors. Stringer: A term applied to a fore-and-aft girder running along the side of a ship and also to the outboard strake of plating on any deck. The side pieces of a ladder or staircase into which the treads and risers are fastened. Stringer Plates: A term applied to the outboard plates on any deck, or to the plates attached to the top flanges of a tier of beams at the side of a vessel. Stiffener: An angle bar, T-bar, channel, etc., used to stiffen plating of a bulkhead, etc. A cofferdam is a void space between two tanks that prevents one tank from leaking directly into the other.

REF467
WEIGHT CALCULATIONS 1 pound _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ = 7,000 grains* = 16 ounces* = 0.45359237 kilogram* 1 short ton _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ = 2,000 pounds* = 907.18474 kilograms* = 0.90718474 metric ton* = 0.8928571 long ton 1 long ton _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ = 2,240 pounds* = 1,016.0469088 kilograms* = 1.12 short tons* = 1.0160469088 metric tons* 1 kilogram _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ = 2.204623 pounds = 0.00110231 short ton = 0.0009842065 long ton 1 metric ton _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ = 2,204.623 pounds = 1,000 kilograms* = 1.102311 short tons = 0.9842065 long ton

REF468
In the United States, a kip is a non-SI unit of force that equals 1,000 pounds-force, used primarily by architects and engineers to measure engineering loads. It is equivalent to one half of a U.S. ton. Although uncommon, it is occasionally also considered a unit of mass, equal to 1,000 pounds, i.e. one half of a U.S. ton. One use is as a unit of deadweight to compute shipping charges. 1 kip = 4448.222 newtons = 4.448222 kilonewtons (kN) The name comes from combining the words "kilo" and "pound"; it is occasionally called a kilopound. Its symbol is kip, or less frequently, klb. When it is necessary to clearly distinguish it as a unit of force rather than mass, it is sometimes called the kip-force (symbol kipf or klbf). Note that the symbol kp usually stands for a different unit of force, the kilopond or kilogram-force.

REF469

Tonnage is a measure of the size or cargo carrying capacity of a ship. The term derives from the taxation paid on tons or casks of wine, and was later used in reference to the weight of a ship's cargo; however, in modern maritime usage, "tonnage" specifically refers to a calculation of the volume or cargo volume of a ship. Tonnage should not be confused with Displacement which refers to the loaded or empty weight of the vessel itself. Gross tonnage (often abbreviated as GT, G.T. or gt) is a unit less index related to a ship's overall internal volume. Gross tonnage is different from gross register tonnage.[1] Neither gross tonnage nor gross register tonnage is a measure of the ship's displacement (mass) and should not be confused with terms such as deadweight tonnage or displacement. Gross tonnage, along with net tonnage, was defined by The International Convention on Tonnage Measurement of Ships, 1969, adopted by the International Maritime Organization in 1969, and came into force on July 18, 1982. These two measurements replaced gross register tonnage (GRT) and net register tonnage (NRT). Gross tonnage is calculated based on "the moulded volume of all enclosed spaces of the ship" and is used to determine things such as a ship's manning regulations, safety rules, registration fees, and port dues, whereas the older gross register tonnage is a measure of the volume of certain enclosed spaces. Net tonnage (often abbreviated as NT, N.T. or nt) is a dimensionless index calculated from the total moulded volume of the ship's cargo spaces by using a mathematical formula. Defined in The International Convention on Tonnage Measurement of Ships that was adopted by the International Maritime Organization in 1969, the net tonnage replaced the earlier net register tonnage (NRT) which denoted the volume of the ship's revenue-earning spaces in "register tons", units of volume equal to 100 cubic feet (2.83 m3).[1] Net tonnage is used to calculate the port duties and should not be taken as less than 30 per cent of the ship's gross tonnage.[2] Net tonnage is not a measure of the weight of the ship or its cargo, and should not be confused with terms such as deadweight tonnage or displacement. Also, unlike the net register tonnage, the net tonnage is unit less and thus can not be defined as "tons" or "net tons". Gross register tonnage (GRT, grt, g.r.t.) a ship's total internal volume expressed in "register tons", one of which equals a volume of 100 cubic feet (2.83 m3). It is calculated from the total permanently enclosed capacity of the vessel. The ship's net register tonnage is obtained by reducing the volume of non-revenue-earning spaces i.e. spaces not available for carrying cargo, for example engine rooms, fuel tanks and crew quarters, from its gross register tonnage.[1][2] Gross register tonnage is not a measure of the ship's weight or displacement and should not be confused with terms such as deadweight tonnage or displacement. Gross register tonnage was defined by the Moorsom Commission in 1854. Gross and net register tonnages were replaced by gross tonnage and net tonnage, respectively, when the International Maritime Organization (IMO) adopted The International Convention on Tonnage Measurement of Ships on 23 June 1969. The new tonnage regulations entered into force for all new ships on 18 July 1982, but existing vessels were given a migration period of 12 years to ensure that ships were given reasonable economic safeguards, since port and other dues are charged according to ship's tonnage. Since 18 July 1994 the gross and net tonnages, dimensionless indices calculated from the total moulded volume of the ship and its cargo spaces by mathematical formulae, have been the only official measures of the ship's tonnage.[3] However, the gross and net register tonnages are still widely used in describing older ships. Deadweight tonnage (also known as deadweight abbreviated to DWT, D.W.T., d.w.t., or dwt) is a measure of how much weight a ship is carrying or can safely carry.[1][2][3] It is the sum of the weights of cargo, fuel, fresh water, ballast water, provisions, passengers, and crew.[1] The term is often used to specify a ship's maximum permissible deadweight, the DWT when the ship is fully loaded so that its Plimsoll line is at the point of submersion, although it may also denote the actual DWT of a ship not loaded to capacity. Deadweight tonnage was historically expressed in long tons but is now usually given internationally in tonnes.[4] Deadweight tonnage is not a measure of the ship's displacement and should not be confused with gross tonnage or net tonnage (or their more archaic forms gross register tonnage or net register tonnage). A ship's displacement or displacement tonnage is the weight of the water that a ship displaces when it is floating; the term is defined ordinarily such that the ship's fuel tanks are full and all stores are aboard. The term is applied usually to naval vessels. Displacement is the actual weight of the ship, since a floating body displaces its own weight in water (Archimedes' principle).[1][2] Another way of thinking about displacement is the weight of the water that would spill out of a completely filled container were the ship placed into it. A number of synonymous terms exist for this maximum weight, such as loaded displacement, full load displacement and designated displacement.[3] As a measurement of weight, displacement should not be confused with similarly named measurements of volume or capacity such as net tonnage, gross tonnage, or deadweight tonnage. The density (weight per unit of volume) of water can vary. For example, the average density of seawater at the surface of the ocean is 1025 kg/m³ (10.25 lb/ga, 8.55 lb/US gallon); fresh water on the other hand has a density of about 1000 kg/m³ (10.00 lb/ga, 8.35 lb/US gallon).[3] Consider a 100-ton ship passing from a saltwater sea into a freshwater river. It always displaces exactly 100 tons of water, but it has to displace a greater volume of fresh water to amount to 100 tons. Therefore it would sit slightly lower in the water in the freshwater river than it would in the saltwater sea. It can be useful to know a ship's displacement when it is unloaded or loaded partially. Terms for these measurements include light displacement, standard displacement, and normal displacement. These terms are defined below.

REF470

A tonnage opening is a specially constructed "door" in a bulkhead on or above the tonnage deck that allows the enclosed space beyond the tonnage opening to be exempt from tonnage measurement. Hull members that run athwartship (from one side to the other) are called "transverse." Those that run from the bow to the stern are called "longitudinal." A ships inner bottom forms the tank top in the engineroom. The double bottom is the space or tank between the inner bottom and the skin or the hull. Vertical transverse members in the double bottom are called floors. Stringer: A term applied to a fore-and-aft girder running along the side of a ship and also to the outboard strake of plating on any deck. The side pieces of a ladder or staircase into which the treads and risers are fastened. Stringer Plates: A term applied to the outboard plates on any deck, or to the plates attached to the top flanges of a tier of beams at the side of a vessel. Stiffener: An angle bar, T-bar, channel, etc., used to stiffen plating of a bulkhead, etc. A cofferdam is a void space between two tanks that prevents one tank from leaking directly into the other. TUMBLE HOME: The decreasing of a vessel's beam above the waterline as it approaches the rail. Opposite of flare. RUN: The underwater portion of a vessel aft of the midship section or flat of the bottom. That portion of the after hull that tapers to the stern post. MIDDLE BODY: That portion of the ship adjacent to the midship section. When it has a uniform cross section throughout, its length its waterlines being parallel to the centerline, it is called the parallel middle body. ENTRANCE: The forward underwater portion of a vessel at or near the bow. The angle formed between the center line of the ship and the tangent to the designed waterline is called the angle of entrance. CAMBER, ROUND OF BEAM : The weather decks of ships are rounded up or arched in an athwartship direction for the purpose of draining any water that may fall on them to the sides of the ship where it can be led overboard through scuppers. The arching or rounding up is called the camber or round of the beam and is expressed in inches in connection with the greatest molded breadth of the ship in feet, thus, "the main deck has a camber of 10 inches in 40 feet." It is measured at the center line of the ship at the greatest molded breadth and is the distance from the chord to the top of the arch. DEADRISE : The angle which the straight portion of the bottom of the floor of the midship section makes with the base line. It is expressed by the number of inches rise above the base line in the half-beam of the vessel. SHEER : The longitudinal curve of a vessel's rails, decks, etc. the usual reference being to the ship's side; however, in the case of a deck having a camber, its center line may also have a sheer. The amount by which the height of the weather deck at the after or forward perpendicular exceeds that at its lowest point. FLARE : The spreading out from a central vertical plane of the body of a ship with increasing rapidity as the section rises from the water line to the rail. COUNTER : That part of a ship's stern which overhangs the stern post, usually that part above the water line. FREEING PORTS : Holes in the lower portion of a bulwark, which allow deck wash to drain off into the sea. Some freeing ports have swinging gates which allow water to drain off but which are automatically closed by sea-water pressure.

REF471
Deadweight tonnage (also known as deadweight, abbreviated to DWT, D.W.T., d.w.t., or dwt) is a measure of how much weight a ship is carrying or can safely carry. It is the sum of the weights of cargo, fuel, fresh water, ballast water, provisions, passengers, and crew. The term is often used to specify a ship's maximum permissible deadweight, the DWT when the ship is fully loaded so that its Plimsoll line is at the point of submersion, although it may also denote the actual DWT of a ship not loaded to capacity. Deadweight tonnage was historically expressed in long tons but is now usually given internationally in tonnes. Deadweight tonnage is not a measure of the ship's displacement and should not be confused with gross register or net tonnage.

REF472
Deadweight tonnage is a measurement of total contents of a ship including cargo, fuel, crew, passengers, food, and water aside from boiler water. It is expressed in long tons of 2,240 pounds (1,016.0469088 kilograms).

REF473
In a direction between abeam and astern; opposite, or nearly opposite, a vessel's quarter.

REF474
bilge well a sump to which bilge water drains

REF475
Weld Faults Most defects encountered in welding are due to an improper welding procedure. Once the causes are determined, the operator can easily correct the problem. Defects usually encountered include incomplete penetration, incomplete fusion, undercutting, porosity, and longitudinal cracking.

REF476
Radiographic and ultrasonic weld inspection are the two most common methods of non-destructive testing (NDT) used to detect discontinuities within the internal structure of welds. The obvious advantage of both these methods of testing is their ability to help establish the weld’s internal integrity without destroying the welded component. We shall briefly examine

these two methods of non-destructive testing (NDT). We shall consider how they are used and what types of welding discontinuities they can be expected to find. We shall examine their advantages over other inspection methods and their limitations. Radiographic Testing (RT) – This method of weld testing makes use of X-rays, produced by an X-ray tube, or gamma rays, produced by a radioactive isotope. The basic principle of radiographic inspection of welds is the same as that for medical radiography. Penetrating radiation is passed through a solid object, in this case a weld rather that part of the human body, onto a photographic film, resulting in an image of the object's internal structure being deposited on the film. The amount of energy absorbed by the object depends on its thickness and density. Energy not absorbed by the object will cause exposure of the radiographic film. These areas will be dark when the film is developed. Areas of the film exposed to less energy remain lighter. Therefore, areas of the object where the thickness has been changed by discontinuities, such as porosity or cracks, will appear as dark outlines on the film. Inclusions of low density, such as slag, will appear as dark areas on the film while inclusions of high density, such as tungsten, will appear as light areas. All discontinuities are detected by viewing shape and variation in density of the processed film. Radiographic testing can provide a permanent film record of weld quality that is relatively easy to interpret by trained personnel. This testing method is usually suited to having access to both sides of the welded joint (with the exception of double wall signal image techniques used on some pipe work). Although this is a slow and expensive method of nondestructive testing, it is a positive method for detecting porosity, inclusions, cracks, and voids in the interior of welds. It is essential that qualified personnel conduct radiographic interpretation since false interpretation of radiographs can be expensive and interfere seriously with productivity. There are obvious safety considerations when conducting radiographic testing. X-ray and gamma radiation is invisible to the naked eye and can have serious heath and safety implications. Only suitably trained and qualified personnel should practice this type of testing. Ultrasonic Testing (UT) – This method of testing makes use of mechanical vibrations similar to sound waves but of higher frequency. A beam of ultrasonic energy is directed into the object to be tested. This beam travels through the object with insignificant loss, except when it is intercepted and reflected by a discontinuity. The ultrasonic contact pulse reflection technique is used. This system uses a transducer that changes electrical energy into mechanical energy. The transducer is excited by a high-frequency voltage, which causes a crystal to vibrate mechanically. The crystal probe becomes the source of ultrasonic mechanical vibration. These vibrations are transmitted into the test piece through a coupling fluid, usually a film of oil, called a couplant. When the pulse of ultrasonic waves strikes a discontinuity in the test piece, it is reflected back to its point of origin. Thus the energy returns to the transducer. The transducer now serves as a receiver for the reflected energy. The initial signal or main bang, the returned echoes from the discontinuities, and the echo of the rear surface of the test piece are all displayed by a trace on the screen of a cathode-ray oscilloscope. The detection, location, and evaluation of discontinuities become possible because the velocity of sound through a given material is nearly constant, making distance measurement possible, and the relative amplitude of a reflected pulse is more or less proportional to the size of the reflector. One of the most useful characteristics of ultrasonic testing is its ability to determine the exact position of a discontinuity in a weld. This testing method requires a high level of operator training and competence and is dependant on the establishment and application of suitable testing procedures. This testing method can be used on ferrous and nonferrous materials, is often suited for testing thicker sections accessible from one side only, and can often detect finer lines or plainer defects which may not be as readily detected by radiographic testing. Stringer: A term applied to a fore-and-aft girder running along the side of a ship and also to the outboard strake of plating on any deck. The side pieces of a ladder or staircase into which the treads and risers are fastened. Stringer Plates: A term applied to the outboard plates on any deck, or to the plates attached to the top flanges of a tier of beams at the side of a vessel. Stiffener: An angle bar, T-bar, channel, etc., used to stiffen plating of a bulkhead, etc. A cofferdam is a void space between two tanks that prevents one tank from leaking directly into the other.