

SURVEY FOR FREEBOARD.

$$\frac{100 (V \pm v)}{L (B - 2b) (D + d + d_1)} + n = \frac{35 \times \Delta}{L \times B_o \times d_o} + 0.04$$

Sketch showing arrangement and height of double bottom or ordinary floors and of superstructures (unless complete plans are submitted).

SEE PLANS.

Sketch of deck erections showing openings in end bulkheads and position and arrangement of closing appliances. Hatchways, and Engine and Boiler openings also to be shown. Extent and thickness of wood deck or composition to be shown in red ink, and extent and thickness of ceiling (and battens) on tank top to be given.

WOOD DECK (Arts. 5 and 6)			
	Mean Length in ft.	Thickness in ins.	Products
Forecastle	46.25	3" = .76 = 2.74	126.63
Bridge	57.75	3" = .76 = 2.74	158.24
Poop or R.Q.D.			
Open Deck, ford.	89.00	3"	267.00
" " aft.	267.00	3"	801.00
Total length = L =	460.00	Sum of Products =	1352.87
Thickness of wood deck at amidships = t =	3" ins.	Sum of Products =	L = 2.94 ins.

CORRECTION FOR DEPTH & CORRECTION FOR FREEBOARD.
 If no sheathing fitted amidships = $t_1 = \pm$ ins. (Arts. 6 and 57 p. 1)
 If sheathing is fitted amidships = $(t - t_1) = \mp .06$ ins. (Arts. 6 and 57 p. 2)
 * Note: Use the upper sign in correction for depth and the lower sign in correction for freeboard.

DEPTH TO USE IN FREEBOARD TABLE.	
Depth moulded	40 ft. 6.72 ins.
Thickness of Stringer Plate	.76 "
Thickness of Wood Deck Amidships	3.00 "
Correction for partial wood deck	-.06 "
Depth to use in Freeboard Tables	40 ft. 10.42 ins. = $D_1 = 40.87$ ft.

SUPERSTRUCTURES.			
HEIGHT (Arts. 46-48)			
Standard Height = $(0.018 L + 1.2)$ ft. =			
	Complete Superstructure	Forecastle	Bridge
Actual	--	7.75	8.0 = 1
Standard	--	7.5	7.5

CLOSING APPLIANCES (Arts. 50 and 54)			
	Forecastle	Bridge	Poop or Raised Quarter Deck
	Forward End.	Aft. End.	
Means of Closing openings in bulkhead	Hinged w.t. doors	Hinged w.t. door	Hinged w.t. door
Corresponding Class	I	I	II

EFFECTIVE LENGTH (Arts. 55 and 56)			
	Mean Length	Coef. Art. 56	Height Coef.
Forecastle closed part	45.03	1	1
Forecastle open part	1.22	1.75	1
Bridge closed part	57.75	1	1
Bridge open part			
" " aft.			
Poop closed part			
Poop open part			
Total Effective Length =	103.70		

Forecastle Area of recess = 60.48	Mean width = 49.5
Forecastle closed part	45.03
Forecastle open part	1.22
Bridge closed part	57.75
Bridge open part	
" " aft.	
Poop closed part	
Poop open part	
Total Effective Length =	103.70

Length of Vessel	r = .23
Corresponding Coef. in Table (Art. 49) =	.138
Reduction for Complete Superstructure	39" ins.
Product	5.38 ins.
Correction for Superstructures	5.38 ins.

EFFECTIVE LENGTH (Shelter Deck Vessels Arts. 87-92)	
$L + \frac{1}{2}(1-p)(L-l) =$	ft.
(* See Art. 90)	

CORRECTION FOR PROPORTIONS L/D (Art. 58)	
When D_1 is less than 35 ft. = $\frac{D_1 + 16}{300} (1 - e/2) (L - 12 D_1)$	
" " greater than 35 ft. = $0.17 (1 - e/2) (L - 12 D_1)$	
[Note e = 1.0 if more than 6/10 covered] =	.17(1 - .069)(460 - 490.44) = 4.82

Are the Engine and Boiler openings covered by a Bridge, Poop, Raised Quarter Deck or enclosed by a strong steel deck house? **Bridge**
 If openings are not so protected give thickness of plating and scantlings and spacing of stiffeners of Casings
 Are suitable means provided for closing all openings in them in bad weather? **Yes**
 State the vertical distance from base line at top of keel to lower edge of lowest side scuttle **375"**
 State if there are any cargo ports or scuppers through sides of vessel below upper deck **W.T. doors**
 State any special features in the construction of the vessel

Sister vessels
 Fee. Yen.
 Depth of Keel ins.; Draught (btm. keel) ft. ins.

CORRECTION FOR ROUND OF BEAM (Art. 59)	
Standard Round of Beam = Length of Beam in ins. =	$\frac{60 \times 12}{50} = 14.4$
Correction = $\frac{1}{2}(\text{Standard Round of Beam} - \text{Actual Round of Beam})$	
=	$\frac{1}{2}(14.4 - 12) = .60$ ins.

CORRECTION FOR FREEING PORTS (in vessels less than 15 ft. Depth Art. 64)	
Length of bulwark in feet each side	ft.
Area of Freeing ports each side	sq. ft.
Area of Freeing ports required by Table	sq. ft.
Correction $1.2 (r - 0.5) D_1 = +$	ins.

CORRECTION FOR ACCESS TO CREW'S QUARTERS (Arts. 65-67)	
Are Crew berthed in Bridge House or Forecastle?	
Height and breadth of gangway	
Correction = $-.012 (80 - l) D_1$ or $1.2 (r - 0.5) D_1$	= + ins.

SUMMARY.	
Freeboard by Tables	133.48 ins.
Correction for Sheer	+ 2.98
" " Partial Wood Deck	.06
" " Superstructures	5.38
" " Proportions L/D	4.82
" " Round of Beam	.60
" " Freeing Ports	--
" " Access to Crew's Quarters	--
Totals	.66 13.18
Net Correction	-12.52
Geometric Freeboard	120.96 ins.
Corresponding Geometric Draught (mld.)	30.79 ft.
Moulded Draught limited by xxx design to	30.00 ft. slide rule.
Corresponding Freeboard (Summer)	129.7 ins.
Winter Freeboard (Art. 22) = $\frac{1}{2}(D_1 - 10) + \frac{1}{4}45(D_1 - D_2)$	
=	$\frac{1}{2}(40.87 - 10) + \frac{1}{4}45(40.87 - 12) = 7.81$ ins.
Tropical Freeboard (Art. 24) do. do.	= - 7.81 ins.

Winter North Atlantic Fbd. (Art. 23) Vessels 330 ft. and below.	
Ratio of effective length of superstructures to length of vessel	
Additional Freeboard	+ ins.

Fresh Water Freeboard (Art. 27)	171.41
1% reduction of Summer Draught	40 x 5.25 = 7.76 ins.

FREEBOARD TO BE ASSIGNED.	
Vertical distance from upper edge of horizontal line indicating the freeboard deck to the centre of the disc. (Summer Line)	129.7 ins.
Fresh Water Load Line above centre of disc.	7.8 ins.
Tropical Load Line above	7.8 ins.
Winter Load Line below	7.8 ins.
Winter N.A. Load Line below	-- ins.

Vertical distance from the point of intersection of the extended line of the upper surface of 3" wood sheathing the upper deck at mid length of the vessel with the outside of shell plating to the upper edge of the horizontal line indicating the freeboard deck	0.00 ins.
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DETAILS OF CONSTRUCTION			
	No. 1	No. 2	
Length and Breadth	Upper Deck 20' 3" x 18' 0"	Upper Deck 27' 6" x 18' 0"	
Height above deck and thickness of side and end coaming	33" .44	33" .44	
Shifting Beams	Number and Material 16 x .36 steel	Three 15 x .36	
Scantlings	4 x 3 x .44	4 x 3 x .44	
* Fore and Afters	Number and Material		
Scantlings			
Thickness of hatches	3"	3"	3"
Remarks			
* When the fore and afters are of wood the depth should be stated from the underside of hatches.			

LONGITUDINAL MODULUS.	
Height of Assumed Axis above base =	16.2

BELOW ASSUMED AXIS.					
Item	Scantlings	Area	Lever	Moment	Mt. of Inertia
Flat Keel	55 x .92	25.3	16.3	412	6720
" "					
Centre Girder	4 x 48 x .6	15.1	14.2	215	3050
C.G. btm. ang.	5 x 5 x .67	6.3	16.1	101	1630
C.G. top angles	5 x 5 x .57	3.7	12.4	46	570
T.T. Cr. Strake	5 x 57	16.2	12.2	198	2420
T.T. plating	69 x .49	33.8	12.2	412	5030
" "	68 x .49	33.3	12.2	406	4960
" "	68 x .49	33.3	12.2	406	4960
" "	55 x .49	27.0	12.2	329	4010
Margin Plate	55 x .57	31.3	12.9	404	5210
" "					
" Angle	3 x 3 x .59	3.7	13.7	51	690
Shell Strake A	78 x .72	56.2	16.2	911	14750
" " B	78 x .72	56.2	16.1	905	14570
" " C	78 x .72	56.2	15.8	888	14030
" " D	75 x .72	54.0	15.3	826	12640
" " E	68 x .72	49.0	12.7	622	7910
" " F	78 x .71	55.4	8.1	449	3640
" Part	65 x .71	46.2	2.7	125	340
Totals below assumed axis		602.2		7706	107130
" above assumed axis		599.3		9565	187930
Sum or Difference		1201.5	1.548	1859	295060
Moment of Inertia about assumed axis = 590120					

Neutral Axis above assumed axis (x) =	1.548
Correction = (Total Area x x^2 x 2)	= 2880 x 2 = 5760
Moment of Inertia about Neutral Axis	584360
Distance from Neutral Axis to top of Strength deck beam at side	22.75 ft.
MODULUS OF SECTION =	25690
Actual Modulus =	25690
f. B. =	60 x 14.13 = 30.30

DRAUGHT PERMITTED BY LONGITUDINAL STRENGTH (Arts. 81-86)	
Minimum Side Plating (Art. 77) $\frac{0.105 \times 460}{100} + 17 = .65$	Standard Frame Spacing (Art. 78) = $.025 \times 460 + 17 = 28.5$
Actual Side Plating	.71
Actual Frame Spacing	33"
If actual frame spacing exceeds the standard $\sqrt{\frac{\text{Actual frame spacing}}{\text{Standard frame spacing}}}$	$t = \sqrt{\frac{33}{28.5}} \times .65 = .70$

Moulded Geometric Draught (d) =	30.79
H =	17.21
f ₁ =	27.33
t =	5.35
K =	30.5
f ₂ =	6.75
d - t =	25.44
f ₁ + f ₂ =	34.08

Standard I/y = $\frac{s(d-t)(f_1 + f_2)}{1000} = \frac{33 \times 25.44 \times 34.08}{1000} = 28.6$	
Frame in ship = $\frac{10 \times 38 \times 40 \times 44 \times 34 \times 40 \times 38}{1000} = 29.3$	
spacing, I/y =	29.3

DRAUGHT PERMITTED BY TRANSVERSE STRENGTH	
$\frac{I/y \times 1000}{s(f_1 + f_2)} + 5.35$	
=	$\frac{29.3 \times 1000}{33 \times 34.08} + 5.35 = 31.41$
I =	44.3 = 44.3 - 29.3
s =	10 x 31 x .70
	without plating.

LONGITUDINAL MODULUS.					
Item	Scantlings	Area	Lever	Moment	Mt. of Inertia
Top Deck Str.	65 x .76				
" " "	46 x .56				
" " Plating	77 x .54				
" " "	43 x .54				
" " Str. Ang.	6 x 6 x .76				
2nd Deck Str.	51 x .45				
" " Plating	77 x .41				
" " "	77 x .41				
" " "	77 x .41				
" " Str. Ang.	44 x .41				
3rd Deck Str.	51 x .35				
" " Plating	77 x .35				
" " "	77 x .35				
" " Str. Ang.	44 x .35				
Sheerstrake	78 x .83				
Strake below	78 x .71				
Shell Strake	78 x .71				
" " "	78 x .71				
Part	63 x .71				
Totals above assumed axis		599.3		9565	187930
Neutral Axis above assumed axis (x) =	1.548				
Correction = (Total Area x x^2 x 2)					
Moment of Inertia about Neutral Axis					
Distance from Neutral Axis to top of Strength deck beam at side					

