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LLOYD'S REGISTER OF SHIPPING.

(CLASSIFICATION SOCIETY RECOGNISED BY THE JAPANESE GOVERNMENT)

SURVEY FOR FREEBOARD.

Ship's Name "HIKAWA MARU" "HIYE MARU"	Port of Registry Tokyo.	Official No. --	No. in R.B. --	Gross Tonnage 11600 about.	Tonnage under Fbd. Deck = V --	Date of Launch 30/9/29 12/2/30	Date when Built --	Report Number 66
Owners Nippon Yusen Kaisha.		Builders Yokohama Dock & Eng. Co. Ltd.			Yard No. 177 178	Port of Survey Yokohama.		
Type of vessel Light Scantling Long Bridge & Ro'cle.	Particulars of Classification + 100 A. 1. with freeboard.		Position of Freeboard Deck Upper Deck		Date of Survey while Building.			
					Name of Surveyor A. McGlashan & H. J. Cox.			

PRINCIPAL DIMENSIONS.

Length between perpendiculars 510 ft.	Breadth Moulded = B ₀ 66.0 ft.	Depth Moulded to Fbd. deck = D ₀ 41 ft.
Length on Load Line 510 ft.	Thickness of Side plating in ins. x $\frac{3}{12}$ + ft.	Round of Beam + ft.
	* ($\frac{2}{12}$ if plating is jogged)	Depth from base line to top of inner bottom plating or ordinary floors - ft.
Length for Freeboard = L 510 ft.	Breadth for Freeboard = B 66.0 ft.	Depth for Tonnage Coef. (Art. 39) = D 41 ft.

CORRECTION TO TONNAGE (Art. 39)

Tonnage between top of ceiling on double bottom
or ordinary floors as fitted and standard level of
top of ceiling (v) = tons.

DEPTH OF DOUBLE BOTTOM (Art. 39)

Depth of Actual Double Bottom
(including plating) or Ordinary Floors ins.
Depth of Standard Double Bottom
(including plating) or Ordinary Floors ins.
Difference
 $\times \frac{1}{12} = \dots = d$.

SHEER (Arts. 39 and 60-63)

Ordinate	Height of Sheer in inches.	S.M.	Products
1	108	1	108.00
2	48.25	4	193.00
3	12.625	2	25.25
4	0	4	0
5	5.25	2	10.50
6	21.00	4	84.00
7	48.00	1	48.00

Sum of Products = **468.75**

Mean Height of Sheer = $S = \frac{\text{Sum of Products}}{18} = \frac{468.75}{18} = \mathbf{26.04}$ ins.

Standard Mean Height = $S_0 = \frac{1}{3}(L/10 + 10) = \frac{1}{3}(510/10 + 10) = \mathbf{20.33}$ ins.

Difference $\times \frac{1}{12} = \dots$ ft. = d₁

Correction (Arts. 60-63) = $\frac{3}{4}(1-e)(S_0 - S) = \frac{3}{4}(1-e)(20.33 - 26.04) = \mathbf{-2.71}$ ins.

FRAMING (Art. 39)

Between Frames	Length in ft.	Depth of Frame in ins.	Thickness of Sparring in inches	Total depth in inches	Products ft. x inches

Sum of Products =

Sum of Products = Actual Mean Depth of framing ins.
Length of Ship

Standard „ „ „ „ ins.

Difference $\times \frac{2}{12} = \dots = 2b$

COEFFICIENT OF FINENESS (Art. 37 or 43)

$$\frac{100(V + v)}{L(B - 2b)(D + d + d_1) + n}$$

= + =

at **34.85'** above Top of Keel.

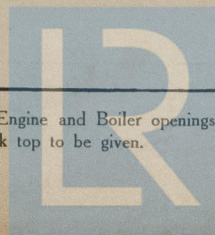
$$\text{or } \frac{35 \times \Delta}{L \times B_0 \times d_0} + 0.04$$

$$= \frac{35 \times 23750}{510 \times 66 \times 34.85} + 0.04 = \mathbf{.75}$$

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.



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Lloyd's Register
Foundation

010369-010377-00601/4

WOOD DECK (Arts. 5 and 6)			
	Mean Length in ft.	Thickness in ins.	Products
Forecastle	73.75	3.5	258.19
Bridge	227.15	3.5	795.03
Poop or R.Q.D.	--	--	--
Open Deck, ford.	70.50	3.5	246.75
" " aft.	138.60	3.5	485.10
Total length =	510	Sum of Products =	1616.5
Sum of Products	= t = ins.; Sum of Products = t ₁ = 3.17 ins.		

CORRECTION FOR DEPTH & CORRECTION FOR FREEBOARD.
 If no sheathing is fitted amidships = t₁ = \pm 3.17 ins. (Arts. 6 and 57 p. 1)
 If sheathing is fitted amidships = (t - t₁) = \mp 0 ins. (Arts. 6 and 57 p. 2)
 * Note: Use the upper sign in correction for depth and the lower sign in correction for freeboard.

Composition on upper deck amidships.
 Depth to use in Freeboard Table. 41 ft. 0 ins.
 Thickness of Stringer Plate. .56
 Thickness of Wood Deck Amidships. 0
 Correction for partial wood deck. \pm 3.17
 Depth to use in Freeboard Tables. 41 ft. 3.73 ins. = D₁ = 41.31 ft.

SUPERSTRUCTURES.				
HEIGHT (Arts. 46-48)				
Standard Height = (0.018 L + 1.2) ft. = 7' - 6".				
	Complete Superstructure	Forecastle	Bridge	Poop or R.Q.D.
Actual	--	7' 9"	9' 0"	--
Standard	--	7' 6"	7' 6"	--

CLOSING APPLIANCES (Arts. 50 and 54)				
	Forecastle	Bridge	Poop or Raised Quarter Deck	
	Forward End.	After End.		
Means of Closing openings in bulkhead	Hinged Wood doors	Hinged W.T.D. steel doors	Hinged Wood doors	--
Corresponding Class	II	I	II	

EFFECTIVE LENGTH (Arts. 53 and 56)				
	Mean Length	Coef. Art. 56	Height Coef.	Products.
Forecastle closed part	73.75	1.0	1.0	73.75
" " open part	--	--	--	--
Bridge closed part	227.15	1.0	1.0	227.15
" " open part ford.	--	--	--	--
" " " aft.	--	--	--	--
Poop closed part	--	--	--	--
" " open part	--	--	--	--

Total Effective Length = 300.90
 Total Effective Length = r = $\frac{300.9}{510}$.59
 Corresponding Coef. in Table (Art. 49) = e = .368
 Reduction for Complete Superstructure. 39. ins.
 Product. 14.35 ins.
 Correction for Superstructures. 14.35 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 D₁ 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 5/10 covered] = .17 x .816 x 14.28 + 1.98 ins.

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. **about 38'-0".**
 State if there are any cargo ports or scuppers through sides of vessel below upper deck. **Yes**
 State any special features in the construction of the vessel. **All W.T. Bulkheads extend to upper deck.**
 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. = 15.84 ins.
 Correction = $\frac{1}{2}(\text{Standard Round of Beam} - \text{Actual Round of Beam})$
 = $\frac{1}{2}(15.84 - 12.1) = 1.87$ 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) D₁ = + 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) D₁ or 1.2 (r - 0.5) D₁ = + ins.

SUMMARY.
 Freeboard by Tables. 133.04 ins.
 Correction for Sheer. 2.71 ins.
 " " Partial Wood Deck. 3.17 ins.
 " " Superstructures. 14.35 ins.
 " " Proportions L/D. 1.98 ins.
 " " Round of Beam. .96 ins.
 " " Freeing Ports. --
 " " Access to Crew's Quarters. --
 Totals. 2.94 20.23
 Net Correction. -17.29
 Geometric Freeboard. 115.75 ins.
 Corresponding Geometric Draught (mld.) 31.4 ft.
 Moulded Draught limited by (form design) to 30.06 ft. By Slid Rule
 Corresponding Freeboard (Summer). 131.8 ins.

Winter Freeboard (Art. 22) = $\frac{1}{2}(D_1 - 10) + \frac{1}{4} \times 59 (59 - D_1)$
 = + ins.
 Tropical Freeboard (Art. 24) do. do. = - 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)
 $\frac{1}{4}$ per foot of Summer Draught = $\frac{10060}{40 \times 63.75} = 7.87$ 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). 131.8 ins.
 Fresh Water Load Line above centre of disc. 7.9 ins.
 Tropical Load Line above " " " -- ins.
 Winter Load Line below " " " -- ins.
 Winter N.A. Load Line below " " " -- ins.
 Vertical distance from the point of intersection of the extended line of the upper surface of **31.1 Str.** of 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. 0.0 ins.

DETAILS OF CONSTRUCTION OF WEATHER DECK HATCHWAYS.

	No. 1	No. 2	No. 3	No. 4	No. 5	No. 6
Length and Breadth	20' 3" x 18' 0"	32' 6" x 20' 0"	16' 6" x 18' 0"	13' 9" x 18' 0"	27' 6" x 18' 0"	19' 3" x 18' 0"
Height above deck and thickness of side and end coaming	33" x .44	33" x .44	33" x .44	33" x .44	33" x .44	33" x .44
Shifting Beams	3 steel 16" x .36	6 steel 17" x .36	2 steel 15" x .32	2 steel 15" x .32	5 steel 17" x .36	3 steel 16" x .36
* Fore and Afters	All angles 4 x 3 x .44					
Thickness of hatches	3"	3"	3"	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 = 16.4' above Top of Keel.					
Section at No. 2 hatch (Frame 142).					
BELOW ASSUMED AXIS.					
Item	Scantlings	Area	Lever	Moment	Mt. of Inertia
Flat Keel	57 x .98 x $\frac{1}{2}$	27.9	16.4	458	7500
" "	" "	" "	" "	" "	" "
Centre Girder	51 x .64 x $\frac{1}{2}$	16.3	14.3	233	3340
C.G. btm. ang.	5 x 5 x 70 x $\frac{1}{2}$	3.3	16.3	54	880
C.G. top angles	3 x 3 x 60 x $\frac{1}{2}$	1.9	12.3	23	290
T.T. Cr. Strake	60 x .58 x $\frac{1}{2}$	17.4	12.1	211	2550
T.T. plating	73" x .50	36.5	12	438	5260
" "	76" x .50	38.0	12.1	460	5570
" "	29" x .50	14.5	12.0	174	2090
Cont. Side Girder	44 x .46	20.3	13.9	282	3920
Top & Bottom Angles	6 x 6 x .50 x $\frac{1}{2}$	11.5	13.9	160	2230
Margin Plate	42 x .60	25.2	13.4	338	4530
" " Angle	12 x .60	7.2	12.1	87	1050
" " " "	3 x 3 x .60	3.8	14.6	56	810
Shell Strake A	77 x .72	55.8	16.3	910	14830
" " B	77 x .72	56.0	16.1	902	14520
" " C	53 x .72	38.2	15.5	592	9180
" " D	70.0 x .72	50.4	14.1	711	10030
" " E	56.31 x .72	40.5	11.7	474	5550
" " F	69 x .72	50.2	8.4	422	3540
" " G	81 x .72	58.3	3.1	181	560
Totals below assumed axis		573.2		7166	98230
" above assumed axis		723.1		13543	303380
Sum or Difference		1296.3	4.92	6377	401610
Moment of Inertia about assumed axis. 803220					
ABOVE ASSUMED AXIS.					
Item	Scantlings	Area	Lever	Moment	Mt. of Inertia
Top Deck Str.	71 x .84	59.6	26.9	1604	43150
" " "	49 x .70	34.3	27.2	933	25380
" " Plating	76 x .70	53.6	27.3	1463	39920
" " "	54 x .70	37.8	27.5	1040	28600
" " "	33 x .70	23.1	27.6	638	17580
" " Str. Ang.	7 x 7 x .86	11.3	26.9	304	8180
2nd Deck Str.	43 x .48	20.6	18.9	389	7360
" " Plating	49 x .44	21.6	19.1	413	7880
" " "	63 x .44	27.7	19.3	535	10320
" " "	67 x .44	29.7	19.5	579	11290
" " Str. Ang.	42 x .44	18.5	19.5	361	7040
3rd Deck Str.	43 x .40	17.2	10.0	172	1720
" " Plating	49 x .36	17.6	10.2	180	1830
" " "	68 x .36	24.5	10.4	255	2650
" " "	65 x .36	23.4	10.5	246	2580
" " Str. Ang.	36 x .36	13.1	10.6	139	1470
Sheerstrake	59 x 1.02	60.2	25.5	1535	39150
Strake below	76 x .88	66.9	20.2	1351	27300
Shell Strake	71 x .72	51.1	14.6	746	10890
" " "	78 x .72	56.2	8.9	500	4450
" " "	76 x .72	55.1	2.9	160	4640
Totals above assumed axis		723.1		13543	303380
Neutral Axis above assumed axis (x) = 4.92					
Correction = (Total Area x x ² x 2) = -1296.3 x 2 x 4.92 ² = 62760					
Moment of Inertia about Neutral Axis. 740460					
Distance from Neutral Axis to top of Strength deck beam at side = 21.80 ft. (including sheer)					
MODULUS OF SECTION = 33960					
Actual Modulus = 33960					
f. B. = 16.74 x 66 = 30.75					

DRAUGHT PERMITTED BY LONGITUDINAL STRENGTH (Arts. 81-86)

TRANSVERSE MODULUS.
 Minimum Side Plating (Art. 77) $\frac{0.105 \times 510 + 17}{100} = .71$; Standard Frame Spacing (Art. 78) = .025 x 510 + 17 = 29.75
 Actual Side Plating = .72; Actual Frame Spacing = 33
 If actual frame spacing exceeds the standard $\sqrt{\frac{\text{Actual frame spacing}}{\text{Standard frame spacing}}} = \sqrt{\frac{33}{29.75}} = 1.05$
 Moulded Geometric Draught (d) = 31.40
 No. 2 Hold. d - t = 25.92
 Standard I/y = $\frac{s(d-t)(f_1 + f_2)}{1000} = \frac{33 \times 25.92 \times 37.43}{1000} = 32.03$
 Frame in ship = 10 x 3 x .42, 6 x 3 x .40, 11" x 3 x .67
 Draught permitted by TRANSVERSE STRENGTH = $\frac{I/y \times 1000}{s(f_1 + f_2)} + t = \frac{32.03 \times 1000}{33 \times 37.43} + 11 = 31.88$
 I = 418
 I/y = 48.8
 11" girder
 I = 415
 I/y = 48.8
 32.6 (without plate)

