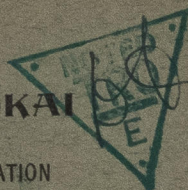


TEIKOKU KAIJI KYOKAI

THE IMPERIAL JAPANESE MARINE CORPORATION



4517

Report No. 2906 No. in Register Book 762

S.S. " TONAN MARU NO.3 "

Makers of Engines OSAKA IRON WORKS, LD. (RECIPRO)
MITSUBISHI JUKOGYO KAISHA (EXH. TURB)

Works No. 1330 (RECP)
3738 (EXH. T.)

Makers of Main Boilers OSAKA IRON WORKS, LTD.

Works No. 1330.

Makers of Donkey Boiler NIL.

Works No. /

MACHINERY.



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010652-010661-0191

TEIKOKU KAIJI KYOKAI

THE IMPERIAL JAPANESE MARINE CORPORATION

Report No. No. in Register Book 4517

Received at Head Office 13/10/39

Surveyor's Report on the Engines, Boilers, and Auxiliary
Machinery of the Single Triple Screw
Twin Quadruple

Official No. 4517

Port of Registry TEIKO

Registered Owners Kyodo Gyoogyo K.K.

Engines Built by Osaka Iron Works, Ltd. (Screw)
Mitsubishi Tokyo Marine Engine Co. Ltd. (Triple)

at Osaka

Main Boilers Built by Osaka Iron Works, Ltd.

at Osaka

Donkey

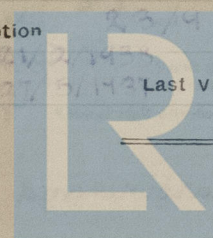
at Nil

Date of Completion 23/4

First Visit 27/5/1939

Last Visit 23/4/1939

Total Visits 1



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RECIPROCATING ENGINES

Works No. 1330 No. of Sets 2 Description 3 cylinders Triple expansion Surface Condensing Engine with exhaust Turbines

No. of Cylinders each Engine 3 No. of Cranks 3

Diam. of Cylinders 570, 440, 1550 Stroke 1150

Cubic feet in each L.P. Cylinder 76.5 total 153.0

Are Spring-loaded Relief Valves fitted to Top and Bottom of each Cyl.?

" " " each Receiver? H.P. No., I.P. & L.P. fitted

Type of H.P. Valves, Piston Valves

" 1st I.P. " 00.

" 2nd I.P. "

" L.P. " Double ported Flat Valves

" Valve Gear Stephenson's Link motion

" Condenser Surface Cooling Surface 300.7 sq. ft.

Diameter of Piston Rods (plain part) 1.95 Screwed part (bottom of thread) 1.15 4 5/16 in.

Material " Steel

Diam. of Connecting Rods (smallest part) 1.75 Material Steel

" Crosshead Gudgeons 1.90 Length of Bearing 1.90 x 2 Material Steel

No. of Crosshead Bolts (each) 4 Diam. over Thrd. 2 1/2 Thrd. per inch 6 Material Steel

" Crank Pin " 2 " 3 1/2 " 6 " "

" Main Bearings 6 Lengths 350

" Bolts in each 2 Diam. over Thread 2 3/4 Threads per inch 6 Material Steel

" Holding Down Bolts, each Engine 88 Diam. 1 1/2 No. of Metal Chocks 76

Are the Engines bolted to the Tank Top or to a Built Seat? To tank top

Are the Bolts tapped through the Tank Top and fitted with Nuts Inside? Yes.

If not, how are they fitted? In reference to the turbines and reduction gear cases see page 4.

Connecting Rods, Forged by Crake Iron Works, Ltd.

Piston " " " " " "

Crossheads " " " " " "

Connecting Rods, Finished by " " " " " "

Piston " " " " " "

Crossheads, " " " " " "

Date of Harbour Trial 7/4/1938

" Trial Trip 9/4/1938

Trials run at Off Awaji

Were the Engines tested to full power under Sea-going conditions? Yes.

If so, what was the I.H.P.? 5781 (Receiv.) 8200 Prob. shaft 105.8

" " " " " " Total Revols. per min 21.7 R. 710

Pressure in 1st I.P. Receiver, S. 52.5 lbs., 2nd I.P., " lbs., L.P., S. 1.65 lbs., Vacuum, S. 700 mm

Speed on Trial 1st 15.209 2nd 13.055 main 14.132 knots

If the Conditions on Trial were such that full power records were not obtained give the following estimated data.—

Builders' estimated I.H.P.

Revs. per min

Estimated Speed

	H.P.	H.P.	I.P.	L.P.
Trials of cyl. Port	35	40	44	44
Starboard	35	40	42	44
Dates of Hydraulic test S.	18/12/37	13/12/37	18/12/37	18/12/37
Test press. Kg/cm ²	24	24	12	4.8
Diam. of Receiver cyl.	50	75	100	100
Relief Valve	Nil	75	100	100
Type of piston rings	same	same	same	same
No. of rings	3	3	1 set	1 set
Length and width of guide shoes	600 x 400	600 x 400	600 x 400	600 x 400
ahead	600 x 400	600 x 400	600 x 400	600 x 400

Description of Condensers

Type
No.

Main

Aux.

Surface

Surface

2

1

Each. dia. & no. of tubes

14, 1675

14, 13+2

Length bet. tube plates

3000

3000

Cooling Surface sq. mtr.

300.7

240.3

Kind of packing glands

Screw

Screw

Each turbine casing, reduction gear and thrust block are mounted on common bed and the bed is bolted to tank top, with 8-1/2" dia. reamer bolts and 14-1/2" dia loose bolts

Exhaust TURBINE ENGINES.

Works No. 37, 38 Type of Turbines Reaction Type, having 7 blade rows.
No. of H.P. Turbines - No. of I.P. - No. of L.P. - No. of Stern -

No. of Exhaust Turbines- 2sets (port & starbd.)

Are the Propeller Shafts driven direct by the Turbines or through Gearing? by gearing (See below)

Is Single or Double Reduction Gear employed? Double reduction single helical gear

Revs. per min. of H.P. Turbines at Full Power 4000 (normal designed)

" " I.P. " " ---

" " L.P. " " ---

" " 1st Reduction Shaft ---

" " 2nd " 96

" " Propeller Shaft "

Total Shaft Horse Power 900 I.H.P./set

Date of Harbour Trial

" Trial Trip

Trials run at

Speed on Trial

Turbine Spindles forged by Nagasaki Zosensho, Mitsubishi Jukogyo K. K.

" Wheels forged or cast by (Wheel rim) Do.

Reduction Gear Shafts forged by Do.

" Wheels forged or cast by (Wheel rim) Do.

DESCRIPTION OF INSTALLATION.

The Mitsubishi Bauer-Wach exhaust steam turbine of reaction type, having 7 blade rows is connected to each main shaft by means of double reduction gearings the first reduction gear wheel in incorporating the Vulcan Hydraulic Coupling. When going ahead the turbine takes

steam from reciprocating engine when maneuvering or going astern steam is passed directly into condenser by means of a change over valve which is operated by a piston through an oil relay attached to the reverse lever of reciprocating engine.

The exhaust turbines and reduction gear have been constructed by the Kobe Zosensho, Mitsubishi Jukogyo K. K. and surveyed during construction.

Turbine rotor of solid type:-

Dia. of rotor body - 700 mm.

" " shaft - 100 mm., 125 mm. at bearing

" " single thrust collar 256 mm.

Blading; the whole blades are made of 5% nickel steel and secured into grooves of rotor body with mild steel packing pieces.

Type of blade - Sellation blade, mooving blade effective height - 1st. row - 87.95 mm.
- last row - 186.78 mm.

Breadth of blades - 1st. - 4th. - 18 mm.,
5th. - 18.83 mm. 6th. - 21 mm. 7th. - 14 mm.

Reduction gears:-

1 st. pinion shaft, dia. 100 mm. 115 mm. at bearing.
No. of teeth - 44, p.c.d. - 202.52 mm.

1st. reduction gear wheel incorporating Vulcan coupling primary half, No. of teeth - 305,
p.c.d. - 1403.83 mm.

2nd. pinion shaft coupling to Vulcan coupling secondary half; No. of teeth - 46, p.c.d. - 317.59 mm.
dia. of shaft - 280 mm., dia. of centre bore - 230 mm., the pinion shaft is hollowed and has a 1st. reduction gear wheel shaft, dia. 190 mm.

1st. red. gear wheel shaft; dia. - 190 mm.

2nd. " " wheel; No. of teeth - 275,
p.c.d. 1898.62 mm.

2nd. red. gear wheel shaft; dia. of shaft - 470 mm., the above shaft is hollowed and has a thrust shaft, and coupled to connecting piece between propeller thrust shaft and intermediate shaft, deadning shock impact.

Spiral angle of all helical gears
- 29° - 39' - 5".



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TURBO-ELECTRIC PROPELLING MACHINERY.

No. of Turbo-Generating Sets Capacity of each

Type of Turbines employed

Description of Generators

No. of Motors driving Propeller Shafting

Are the Propeller Shafts driven direct by the Motors or through Gearing?

Is Single or Double Reduction Gear employed?

Description of Motors

Revs. per min. of Generators at Full Power

" " Motors "

" " Propellers "

Total Shaft Horse Power "

Date of Harbour Trial

" Trial Trip

Trials run at

Makers of Turbines

" Generators

" Motors

" Reduction Gear

Turbine Spindles forged by

" Wheels forged or cast by

Reduction Gear Shafts forged by

" Wheels forged or cast by



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SHAFTING.

Are the Crank Shafts Built or Solid?

Built

No. of Lengths in each

3

Angle of Cranks

120°

Diar. by Rule

327

Actual

340

In Way of Webs

345

" of Crank Pins

345

Length between Webs

360

Greatest Width of Crank Webs

650

Thickness

215

Least " "

495

"

215

Diar. of Keys in Crank Webs

45

Length

150

" Dowels in Crank Pins

45

Length

Screwed or Plain

Plain

No. of Bolts each Coupling

9

Diar. at Mid Length

70

Diar. of Pitch Circle

510

Greatest Distance from Edge of Main Bearing to Crank Web

*5*Type of Coupling flange *Solid, dia. 630, thick. 90.*

① Type of Thrust Blocks

mono-collar type

No. " Rings

set of bearing pad pieces on each

②

Diar. of Thrust Shafts at bottom of Collars

375

No. of Collars

One

" " "

Forward Coupling

340

At Aft Coupling

*off taper**and is coupled to connect coupling piece (see p. 7.)*

Diar. of Intermediate Shafting by Rule

Actual

330

No. of Lengths

1

No. of Bolts, each Coupling

9

Diar. at Mid Length

70

Diar. of Pitch Circle

*FOR 604
AFT 530**dia. of coupling flange 630. Thick. 90. For 90 AFT 150*

Diar. of Propeller Shafts by Rule

344.3

Actual

370

At Couplings

350

Are Propeller Shafts fitted with Continuous Brass Liners?

Yes

Diar. over Liners

*FOR 414**AFT 416*

Length of After Bearings

1500

Of what Material are the After Bearings composed?

Gunmetal strips

Are Means provided for lubricating the After Bearings with Oil?

Yes

" " "

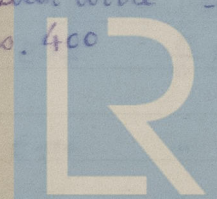
to prevent Sea Water entering the Stern Tubes?

Yes

If so, what Type is adopted?

*Date of launch**1/5, 1938*

SKETCH OF CRANK SHAFT.

*See attached plan**Type of coupling of propeller shaft. fitted.**No. of bolts 9. Dia. at mid length 70.**Dia. of pitch circle 530. dia. of coupling 650**Thickness 400**Clearance at stern tube bearing 1.5 mm.*Lloyd's Register
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No. of Blades each Propeller +

Pitted or Solid?

Material of Blades

Boss

Diam. of Propellers

Pitch

Surface (each)

S. ft.

Coefficient of Displacement of Vessel at $\frac{1}{2}$ Moulded Depth

Crank Shafts Forged by

Material

Pins

Webs

Thrust Shafts

Intermed. "

Propeller "

Crank " Finished by

Thrust "

Intermed. "

Propeller "

STAMP MARKS ON SHAFTS

Crank shafts

2-journals }
1-pinVR A73032 $\frac{2}{3}$ TENSILE
STRENGTH
KG.Elongation
% Bend.

49.2 35.6 good

2-journals }
1-pin" " " $\frac{3}{4}$

49.3 33.3 "

2-journals }
1-pin

" " " "

49.8 30.7 "

2-journals }
1-pin" B72949 $\frac{2}{3}$

48.3 38.4 "

2-journals }
1-pin

" " " "

46.3 38.0 "

2-journals

" " AT3032 $\frac{2}{3}$

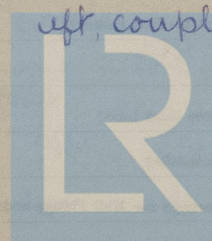
49.5 34.2 "

SKETCH OF PROPELLER SHAFT.

See attached plan

1-pin	VR B72949 $\frac{2}{3}$	46.3	31.1	good.
3-Web	" " B73283 $\frac{2}{3}$	48.6	37.5	"
3-Webs	" " " "	48.1	36.5	"
3- "	" " B73368 +	44.1	37.5	"
3- "	" " " "	44.4	36.5	"
Intermed. shaft	" " A73032 $\frac{2}{3}$	46.3	36.8	"
"	" " VR B73283 $\frac{2}{3}$	46.1	36.8	"
Prob. shaft	" " A73286 $\frac{2}{3}$	45.5	37.3	"
"	" " " " $\frac{2}{3}$	45.7	32.4	"
"	" (spare) " E73589 +1	50.2	33.4	"
Dr. coupling	" " GA73235 $\frac{2}{3}$	47.2	34.0	"
"	" " A73557 $\frac{2}{3}$	47.6	31.1	"
" (spare)	" " A73235 $\frac{2}{3}$	47.2	34.4	"

- Exch. turbine rotor shaft (high tensile stl.) (VR) IK MKF-114-115
 1st. red. pinion shaft (Ni. steel) (VR) IK MKF-121-122
 1st. " gear wheel shaft - VR IK MKF-108-109
 2nd. pinion shaft (Ni. steel) - (VR) IK MKF-123-124
 " gear wheel shaft - VR IK MKF-110-111
 Thrust shaft - VR IK MKF-129-130
 " " aft. coupling pieces - VR IK MKF-131-13

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PUMPS, ETC. 280 380
 No. of Air Pumps 2 dual wet +60 380
 Diar. Dry 500 Stroke +00

Worked by Main or Independent Engines? Independent

No. of Circulating Pumps 2 steam cyl. 10 1/2" Stroke 8"
 Diar.

Type of " Centrifugal dia of Impeller 38"
 +00

Diar of " Suction from Sea

Has each Pump a Bilge Suction with Non-return Valve? yes

What other Pumps can circulate through Condenser? 2 main and 1 aux. circulating pump.
 2 main and 1 aux. circulating pump each other.

No. of Feed Pumps on Main Engine nil

Diar.

Stroke

Are Spring-loaded Relief Valves fitted to each Pump?

Can one Pump be overhauled while the others are at work?

No. of Independent Feed Pumps 3

Diar.

Stroke

What other Pumps can feed the Boilers? nil

No. of Bilge Pumps on Main Engine each 2

Diar.

Stroke

Can one Pump be overhauled while the others are at work?

No. of Independent Bilge Pumps

What other Pumps can draw from the Bilges?

see opposite page.
 No. of pumps in engine room 14
 " " " " 4

Are all Bilge Suctions fitted with Roses?

Are the Valves, etc., so arranged as to prevent unintentional connection between Sea and Bilges? yes

Are all Sea Connections made with Valves or Cocks next the Ship's sides? yes

Are they placed so as to be easily accessible?

Are the Discharge Chests placed above or below the Deep Load Line? above

Are they fitted direct to the Hull Plating and easily accessible? yes

Are all Blow-off Cocks or Valves fitted with Spigots through the Hull Plating and Covering Plates or Flanges on the Outside? Valves, yes

Aux. air pump, Vertical Weir's Single acting.
 380 x 650 - 380

1 Aux. centrifugal circulating pump.
 dia of steam cyl. 9" Stroke 7 1/2" dia of Impeller 34"

2 main feed pumps, Weir's Vertical Simplex.
 +20 x 300 - 600

1 Donkey feed pump, Weir's Vertical Simplex.

420 x 300 - 600
 The above three pumps are fitted with automatic regulators.

Suctions of main bilge pumps:- 3", 2-cofferdam,
 3 1/2", 4-Boiler room, 2 1/2", 1-Engine room fore side,
 2 1/2", 2-Engine room Coff. 3 1/2", 1-Engine room aft side.

No. of pumps which can draw from bilges 10 sets.
 Capacity of these pumps per hr. in tons.

4 main bilge pumps in engine room 70.

1 Independent bilge pump " " 40.

1 Bilge and ballast " " 230.

1 General service " " 46.

1 bilge pump in fore pump room 40.

1 Ballast " " " 92.

1 Bilge " " middle " 42.

1 Bilge ejector " aft

BOILERS.

Works No. 1330

No. of Boilers 6 Type multitubular

Single or Double-ended Single-ended

No. of Furnaces in each 4

Type of Furnaces Morrison's Corrugated

Date when Plan approved 1/12/1937

Approved Working Pressure 15.5 kg. cm²

Hydraulic Test Pressure 26.75 "

Date of Hydraulic Test ^{no. 1} 30/4/1938, ² 13/4, ³ 26/4, ⁴ 6/4, ⁵ 26/3, ⁶ 22/3

" when Safety Valves set 22/8/38 " " 24/8/38 " "

Pressure at which Valves were set 15.8 ^{kg. cm²} 15.9 15.9 15.7 15.9 15.9

Date of Accumulation Test 22/8/38 " " 24/8/38 " "

Maximum Pressure under Accumulation Test ^{not} 10.2 ^{kg.} 17.0 15.9 15.9 16.5

System of Draught Howden's closed ash-pit system

Can Boilers be worked separately? yes

Makers of Plates The Bethlehem steel co., Carnegie-Illinois steel corporation, Nippon Seitetsu Yawata Works, Amano Seitetsusho.

" Stay Bars The Bethlehem steel co.

" Rivets DO.

" Furnaces John Marshall & co.

Greatest Internal Diam. of Boilers 4880

" " Length " 3650

Square Feet of Heating Surface each Boiler 296.8 m² total 1780.8 m²

" " Grate " "

No. of Safety Valves each Boiler 2 Diam. 95 area 70.88 cm²

Are the Safety Valves fitted with Easing Gear? yes

No. of Pressure Gauges, each Boiler 2 No. of Water Gauges 2

" Test Cocks " 3 " " Salinometer Cocks 1

Kind of steam Superheated steam

Kind " Fuel Oil

Quantity of water in working condition, each boiler 28 tons.

Dia. & No. of steam stop Valves Main 105-1 Aux. 195-1

Largest holes in shell plates to which valve box fitted.

180 Aux. steam stop Valve box.

How is it compensated? Forged steel ring of O.Dia.

560, I. Dia. 180, thick + 2 ~ 50 is riveted with 10-26.5 and 14-43.5 rivet holes.

Fan engines:-

No. 2 sets.

Dia. of steam cylinder 9" No. 1. Stroke 7"

Dia. " fan 8'-0"

Where installed? Above fore side in engine room.

Air pressure 70 mm.

Type of Safety valves Spring loaded

Dia. & area of waste steam pipes

For each boiler 140

For each of 3 boilers 305

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153.9 cm²

730.6 cm²

Are the Water Gauges fitted direct to the Boiler Shells or mounted on Pillars? *on pillars*

Are the Water Gauge Pillars fitted direct to the Boiler Shells or connected by Pipes? *by pipes*

Are these Pipes connected to Boilers by Cocks or Valves?

Are Blow-off Cocks or Valves fitted on Boiler Shells?

No. of Strakes of Shell Plating in each Boiler

" Plates in each Strake

Thickness of Shell Plates Approved

" " in Boilers

Are the Rivets Iron or Steel?

Are the Longitudinal Seams Butt or Lap Joints?

Are the Butt Straps Single or Double?

Are the Double Butt Straps of equal width?

Thickness of outside Butt Straps

" inside "

Are Longitudinal Seams Hand or Machine Riveted?

Are they Single, Double, or Treble Riveted?

No. of Rivets in a Pitch

Diar. of Rivet Holes Pitch

No. of Rows of Rivets in Centre Circumferential Seams

Are these Seams Hand or Machine Riveted?

Diar. of Rivet Holes Pitch

No. of Rows of Rivets in Front End Circumferential Seams

Are these Seams Hand or Machine riveted?

Diar. of Rivet Holes Pitch

No. of Rows of Rivets in Back End Circumferential Seams

Are these Seams Hand or Machine Riveted?

Diar. of Rivet Holes Pitch

Size of Manholes in Shell

Dimensions of Compensating Rings

*For following blanks see
attached plan*

machine riveted

machine riveted

Hand riveted



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Thickness of End Plates in Steam Space Approved

" " " " " in Boilers

Pitch of Steam Space Stays

Diar. " " " " Approved Threads per In. b

" " " " " in Boilers

Material of " " "

How are Stays Secured :

Diar. and Thickness of Loose Washers on End Plates

" " Riveted " " "

Width " " Doubling Strips " "

Thickness of Middle Back End Plates Approved

" " " " " in Boilers

Thickness of Doublings in Wide Spaces between Fireboxes

Pitch of Stays at " " " "

Diar. of Stays Approved Threads per Inch

" " in Boilers

Material "

Are Stays fitted with Nuts outside ?

Thickness of Back End Plates at Bottom Approved

" " " " " in Boilers

Pitch of Stays at Wide Spaces between Fireboxes

Thickness of Doublings in " "

Thickness of Front End Plates at Bottom Approved

" " " " " in Boilers

No. of Longitudinal Stays in Spaces between Furnaces



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Diam. of Stays Approved Threads per Inch

„ „ in Boilers

Material „

Thickness of Front Tube Plates Approved

„ „ „ „ in Boilers

Pitch of Stay Tubes at Spaces between Stacks of Tubes

Thickness of Doublings in „ „ „

„ Stay Tubes at „ „ „

Are Stay Tubes fitted with Nuts at Front End ?

Thickness of Back Tube Plates Approved

„ „ „ in Boilers

Pitch of Stay Tubes in Back Tube Plates

„ Plain „

Thickness of Stay Tubes

„ Plain „

External Diam. of Tubes

Material „

Thickness of Furnace Plates Approved

„ „ „ in Boilers

Smallest outside Diam. of Furnaces

Length between Tube Plates

Width of Combustion Chambers (Front to Back)

Thickness of „ „ Tops Approved

„ „ „ „ in Boilers

Pitch of Screwed Stays in O.C. Tops



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Diar. of Screwed Stays Approved

Threads per Inch

" " " in Boilers

Material " "

Thickness of Combustion Chamber Sides Approved

" " " " in Boilers

Pitch of Screwed Stays in O.O. Sides

Diar. " " Approved

Threads per Inch

" " " in Boilers

Material " "

Thickness of Combustion Chamber Backs Approved

" " " in Boilers

Pitch of Screwed Stays in O.O. Backs

Diar. " " Approved

Threads per Inch

" " " in Boilers

Material " "

Are all Screwed Stays fitted with Nuts inside O.O.?

Thickness of Combustion Chamber Bottoms

No. of Girders over each Wing Chamber

" " " Centre "

Depth and Thickness of Girders

Material of Girders

No. of Stays in each

No. of Tubes, each Boiler

Size of Lower Manholes

Lagging:-

material

Asbestos.

Thickness

3"

Ranges

All part, except smoke boxes.

How are the boilers secured?

Beh. each boilers, with a steel angles 125 x 90
x 13 and steel plates 22 x 600 in 2 places.

To bearers, with 2 flat steel bars 22 x 140
in 4 places.

Fore and aft end at bottom with steel plates
22 thickness



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VERTICAL DONKEY BOILERS. *nil*

No. of Boilers	Type	
Greatest Int. Diar.	Height	
Height of Boiler Crown above Fire Grate		
Are Boiler Crowns Flat or Dished?		
Internal Radius of Dished Ends	Thickness of Plates	
Description of Seams in Boiler Crowns		
Diag. of Rivet Holes	Pitch	Width of Overlap
Height of Firebox Crown above Fire Grate		
Are Firebox Crowns Flat or Dished?		
External Radius of Dished Crowns	Thickness of Plates	
No. of Crown Stays	Diag.	Material
External Diag. of Firebox at Top	Bottom	Thickness of Plates
No. of Water Tubes	Ext. Diag.	Thickness
Material of Water Tubes		
Size of Manhole in Shell		
Dimensions of Compensating Ring		
Heating Surface, each Boiler	Grate Surface	

SUPERHEATERS.

Description of Superheaters *Schmidt type smoke box superheater*

Where situated?	<i>In smoke boxes and tubes</i>
Which Boilers are connected to Superheaters?	<i>each boiler</i>
Can Superheaters be shut off while Boilers are working?	<i>yes</i>
No. of Safety Valves on each Superheater	<i>1</i>
Are " " fitted with Lasing Gear?	<i>yes</i>
Date of Hydraulic Test	<i>see opposite page</i>
Date when Safety Valves set	<i>22-24/8/38</i>
Test Pressure	<i>31.0 Kg. cm²</i>
Pressure on Valves	<i>15.8 Kg.</i>

Description of Superheaters.

Degree of Super heat	<i>55.5°C</i>
Heating Surface, each boiler	<i>65.0 M²</i>
Total	<i>390.0 "</i>

Super heater pipes:-

material. *steel cold drawn.*makers, *Sumitomo Kuzoku Sagyo K.K.*I. Dia. of tubes *5/8" thick. 18.*No. of tubes each boiler *66. 4 + 7 for spares of 6 boilers*Dates of Hydraulic test *11/7/38 ~ 18/7/38 = 7 visits*Test pressure *46.5 Kg./cm².*

Headers:-

material *steel plates electric welded.*makers. *Osaka Iron Works Ltd.*No. of pieces total *36*Thickness of plates *19.*Dates of hydraulic test *6/38 ~ 13/7/38 = 7 visits*Test press. *31 Kg./cm²*

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MAIN STEAM PIPES.

Boiler Interd. superheater

No. of Lengths	10	10	6	80
Material	Steel	"	"	"
Brazed, Welded or Seamless	Seamless	"	"	"
Internal Diam.	3 1/2"	6"	6"	40
Thickness	5/16"	1/4"	1/4"	5.5
How are Flanges secured?	Riveted	deck weld	"	"
Date of Hydraulic Test	16/7/35 15/8/35	15/8/38	7/7/35 7/7/38	16/7, 6/8 8/8, 13/8
Test Pressure	40.5 kg/cm ²	46.5	46.5	46.5

Main Feed pipes

No. of Lengths	5	11	3	7
Material	Copper	"	"	"
Brazed, Welded or Seamless	Seamless	"	"	"
Internal Diam.	4"	3 1/2"	3"	2"
Thickness L.S.G.	NO. 3	NO. 4	NO. 5	NO. 4
How are Flanges secured?	Brazed	"	"	"
Date of Hydraulic Test	29/7/38	13/6 29/7 14/38	13/6/38	13/6/38 5/7/38
Test Pressure	40 kg/cm ²	40 "	40 "	40 "

Chr. Feed pipes

No. of Lengths	5	11	3	7
Material	Copper	"	"	"
Brazed, Welded or Seamless	Seamless	"	"	"
Internal Diam.	4"	3 1/2"	3"	2"
Thickness L.S.G.	NO. 3	NO. 4	NO. 5	NO. 4
How are Flanges secured?	Brazed	"	"	"
Date of Hydraulic Test	29/7/38	13/6 29/7 14/38	13/6/38	13/6/38 5/7/38
Test Pressure	40 kg/cm ²	40 "	40 "	40 "



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EVAPORATORS.

No. 2 Type Wiers 50 Tons per Day
 Makers The Osaka Iron Works Ltd.
 Working Pressure 1 kg. Test Pressure Shell 2 kg. coil 22.3 Date of Test 2/5/38 - 2 shells
 17/3/38 - 1 coil
 8/3/38 - 1 "

Date of Test of Safety Valves under Steam

FEED WATER HEATERS.

No. 2 Type Surface, Heating surface 18.3 M²
 Makers The Osaka Iron Works Ltd.
 Working Pressure 15.5 kg. Test Pressure 31.0 kg. Water side 18.8/38
 5.0 " " Date of Test 22/8/38
 Ext. dia. of Inlet tube 25 2.77 78 1254
 " " Outside " 150 3.40 70 1056
 " " " 150 4.57 8

FEED WATER FILTERS.

No. 2 Type gravitation 1900x1200x950 Size
 Makers The Osaka Iron Works Ltd.
 Working Pressure Test Pressure Date of Test

Evaporators for factory use.

No. 4 Type Wiers 100 tons/day.
 Makers The Osaka Iron Works Ltd.
 Working pressure 1 kg/cm².

Dates of tests

Test Press.	NO. 1	NO. 2	NO. 3	NO. 4
Shell 3 kg/cm ²	9/3/38	11/5/38	27/5/38	31/5/38
coil 3 kg/cm ²	7/2/"	14/2/"	9/5/"	27/5/"

LIST OF DONKEY PUMPS.

See attached sheets



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SPARE GEAR.

See attached sheet

No. of Top End Bolts.	No. of Bot. End Bolts	No. of Cylinder Cover Studs
" Coupling Bolts	" Main Bearing Bolts	" Valve Chest "
" Junk Ring Bolts	" Feed Pump Valves	" Bilge Pump Valves
" H.P. Piston Rings	" I.P. Piston Rings	" L.P. Piston Rings
" " Springs	" " Springs	" " Springs
" Safety Valve "	" Fire Bars	" Feed Check Valves
" Piston Rods	" Connecting Rods	" Valve Spindles
" Air Pump Rods	" Air Pump Buckets	" Air Pump Valves
" Cir. "	" Cir. "	" Cir.
" Crank Shafts	" Crank Pin Bushes	" Crosshead Bushes
" Propeller Shafts	" Propellers	" Propeller Blades
" Boiler Tubes	" Condenser Tubes	" Condenser Fastenings

OTHER ARTICLES OF SPARE GEAR:—



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REFRIGERATORS.

No. of Machines 4 Capacity of each 25,000 B.T.U. hr.
 Makers The Sabroe Co., of Japan
 Description Multi-effect CO₂ MM-VI Refrigerating machine driven by steam engine

No. of Steam Cylinders, each Machine 1 No. of Compressors 1 No. of Cranks 1

Particulars of Pumps in connection with Refrigerating Plant and whether worked by Refrigerating Machines or Independently

- 4 CO₂ Compressors, dia. & No. of cyl. 60x1. stroke 140. Rev. 1400
 4 25 H.P. steam engine, dia. & No. of cyl. 200x1. " 150 " " "
 3 Brine pumps Horizontal Worthington 150x150-200
 2 Cooling Water pumps Vertical " 4"x4½"-5"
 1 " " " 200x150-200
 3 Condensers, 2-Small and 1-Large size.
 3 Evaporators, 2- " 1- " "

System of Refrigeration Brine cooling system
 " Insulation cork slab

Are Brine and other Regulating Valves placed so as to be accessible without entering the Insulated

Spaces? yes

Are all Pipes, Air Trunks &c., well secured and protected from risk of damage? yes

Are all Bilge, Sounding, and Air Pipes in Insulated Spaces properly insulated? yes

Are Thermometer Tubes so arranged that Water cannot enter and freeze in them? yes

Date of Test under Working Conditions 21, 22/4/1938

RESULTS OF TRIALS.

COMPARTMENT.	Temp at beginning of Trial.	Temp. at end of Trial.	Time required to obtain this Result.	Rise of Temp. after hours.
Insulated store				
No. 1	-2.0	-13.0	31	-7.0
" 2	-3.0	-13.5	"	-6.2
" 3	0.0	-12.0	"	-4.5
" 4	0.0	-13.2	"	-3.2
Insulated cargo				
Hold No. 1	-3.5	-12.7	"	-7.2
" 2	-3.0	-12.0	"	-6.5

Articles of Spare Gear for Refrigerating Plant carried on board:—

See attached sheet



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Positions of Auxiliary Switch Boards, with No. of Switches on each

Aux. Switch Board (W) in Engine Room 3 + 2 spares
 " " (G) in galley 5
 " " (P) in oil separator room 5 + 1 spare
 " " (P2) " " 6
 " " (V) stored in And dk. mid 8
 " " (H) " " up. dk. (none) 5 + 3 spares
 " " (N) in dark room 5 + 1 spare
 " " in black smith shop.
 (shore connection) 5

Are Out-outs fitted as follows?—

On Main Switch Board, to Cables of Main Circuits

On Aux " " each Auxiliary Circuit

Wherever a Cable is reduced in size

To each Lamp Circuit

To both Flow and Return Wires of all Circuits when the Double-Wire System is adopted

Are the Fuses of Standard Sizes?

Are all Switches and Out-outs constructed of Non-Inflammable Material?

Are they placed so as to be always and easily accessible?

Smallest Single Wire used, No. S.W.G. Largest, No. 6/043 S.W.G.

How are Conductors in Engine and Boiler Spaces protected?

Saloons, State Rooms, &c., "

What special protection is provided in the following cases?—

(1) Conductors exposed to Heat or Damp

(2) " passing through Bunkers or Cargo Spaces

(3) " " Deck Beams or Bulkheads

Are all Joints in Cables properly soldered and thoroughly Insulated so that the efficiency of the Cables

Is unimpaired?

Are all Joints in accessible positions, none being made in Bunkers or Cargo Spaces?

Are all Hull Connections for Single-Wire Systems made with Screws of large Surface?

Are the Dynamos, Motors, Main and Branch Cables, so placed that the Compasses

affected by them?

Have Tests been made to prove that this condition has been satisfactorily fulfilled?

Has the Insulation Resistance over the whole system been tested?

What does the Resistance amount to?

Is the Installation supplied with a Voltmeter?

" " " an Ampere Meter?

Date of Trial of complete Installation 19/4/38

Duration of Trial 6 hrs.



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GENERAL CONSTRUCTION.

Have the Machinery and Boilers been constructed in accordance with the requirements of the Rules and the

Approved Plans? *Yes*

If not, give details of the points of difference and state when these were sanctioned by the Chief Surveyor.

The Exhaust turbines, reduction gears and Thrust shafts have been surveyed and reported by the Surveyor I. Sato to this corporation at Kobe and they are shown by marking thus "⊙" in this book.

Are the Materials used in the Construction of Engines and Boilers, so far as could be seen sound and trustworthy? *Yes*

Is the Workmanship throughout thoroughly satisfactory? *Yes*

The above correctly describes the Machinery of the S.S.

"TONAN MARU NO. 3"

as ascertained by ^{us}_{me} from personal examination

H. Kubo

Engineer Surveyor Imperial Japanese
Marine Corporation.

Fees—

MAIN BOILERS.		£	s.	d.
H.S.	1780.8 <i>m.</i> Sq. ft.	:	:	¥ 528.55
G.S.	"	:	:	
DONKEY BOILERS.		<i>Nil</i>		
H.S.	Exhaust turbines at Kobe:			¥ 425.00
G.S.	" " at Osaka			" 55.00
		£	:	:

ENGINES.				
L.P.C.	76.5 x 2 Cub. ft.	:	:	¥ 700.00
Electric apparatus 175 K.W.				¥ 267.50
Testing, &c. ...		:	:	
Refrigerating mach.		:	:	¥ 50.00
Expenses Refrigerator boilers	:	:	¥ 340.00
Total ... £		:	:	
<i>Total</i>				<i>¥ 2482.05</i>

It is submitted that this Report be approved,

Hosokawa
Chief Surveyor.

18 OCT 1939

Approved by the Committee for the Class of *M.B.S.* M.S. on the 18th October 1939.

Fees advised

Fees paid



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