

No. 2365

THE BRITISH CORPORATION FOR THE SURVEY
AND
REGISTRY OF SHIPPING.

Report No. 2423 No. in Register Book 3856

" " MUROTO

S.S. MUROTO

Makers of Engines Swanwick & Co. Ltd.

Works No. 380

Makers of Main Boilers Richardsons Westgarth & Co. Ltd.

Works No. D. 207

Makers of Donkey Boiler ✓

Works No. ✓

MACHINERY.



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015111-015125-0291

No.

THE BRITISH CORPORATION FOR THE SURVEY
AND
REGISTRY OF SHIPPING.

Report No. No. in Register Book

Received at Head Office

16th February 1931

Surveyor's Report on the New Engines, Boilers, and Auxiliary
Machinery of the ~~Single Engine~~ ~~Twin Quadruple~~ *Steam* *Hauler*

Murdo

Official No.

162089

Port of Registry

Cardiff

Registered Owners

Male West Ltd.

Engines Built by

Sydney Dock Co. Ltd.

at

South Bank-on-Sea

Main Boilers Built by

Richardson & Westgarth & Co. Ltd.

at

Cardiff

Donkey

at

Date of Completion

2-31

First Visit

13-2-30

Last Visit

3-2-31

Total Visits

45

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RECIPROCATING ENGINES.

Works No. 380

No. of Sets 1

Description

Triple expansion
S.C. 3 crks.

No. of Cylinders each Engine

No. of Cranks

Diam. of Cylinders

Cubic feet in each L.P. Cylinder

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

Type of H.P. Valves,

1st L.P. "

2nd L.P. "

L.P. "

" Valve Gear

" Condenser

Diameter of Piston Rods (plain part)

Material "

Diam. of Connecting Rods (smallest part)

" Crosshead Gudgeons

No. of Crosshead Bolts (each)

" Crank Pin " "

" Main Bearings

" Bolts in each

" Holding Down Bolts each Engine

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

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

If not, how are they fitted?

Connecting Rods, Forged by

Piston " "

Crossheads,

Connecting Rods, Finished by

Piston " "

Crossheads,

Date of Harbour Trial

" Trial Trip

Trials run at

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

If so, what was the I.H.P.?

Pressure in 1st L.P. Receiver,

Speed on Trial

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

data:—

Builders' estimated I.H.P.

Estimated Speed

Brown Bros.

Piston " "

Crossheads,

Connecting Rods, Finished by

Piston " "

Crossheads,

Date of Harbour Trial

" Trial Trip

Trials run at

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

If so, what was the I.H.P.?

Pressure in 1st L.P. Receiver,

Speed on Trial

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

data:—

Builders' estimated I.H.P.

Estimated Speed



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TURBINE ENGINES.

Works No.	Type of Turbines		
No. of H.P. Turbines	No. of I.P.	No. of L.P.	No. of Stern
Are the Propeller Shafts driven direct by the Turbines or through Gearing?			
Is Single or Double Reduction Gear employed?			
Diag. of 1st Reduction Pinion	} Width	Pitch of Teeth	
" 1st " Wheel		Pitch of Teeth	
Estimated Pressure per lineal inch			
Diag. of 2nd Reduction Pinion	} Width	Pitch of Teeth	
" 2nd " Wheel		Pitch of Teeth	
Estimated Pressure per lineal inch			
Revs. per min. of H.P. Turbines at Full Power			S.H.P.
" " L.P. " "	If the Conditions of Trials were such that the power records were not obtained give the following details		
" " L.P. " "			
" " 1st Reduction Shaft			
" " 2nd " "			
" " Propeller Shaft			
Total Shaft Horse Power			
Date of Harbour Trial			
" Trial Trip			
Trials run at			
Speed on Trial	Knots.	Propeller Revs. per min.	S.H.P.
Turbine Spindles forged by			
" Wheels forged or cast by			
Reduction Gear Shafts forged by			
" Wheels forged or cast by			

DESCRIPTION OF INSTALLATION.

No. of Turbine-generator sets	Capacity of each
Type of Turbines employed	
Description of Generators	
No. of Motors driving Propeller Shafts	
Are the Propeller Shafts driven direct by the Motors or through Gearing?	
Is Single or Double Reduction Gear employed?	
Description of Motors	
Diag. of 1st Reduction Pinion	} Width
" 1st " Wheel	
Estimated Pressure per lineal inch	
Diag. of 2nd Reduction Pinion	} Width
" 2nd " Wheel	
Estimated Pressure per lineal inch	
Revs. per min. of Generators at Full Power	
" " " "	
" " 1st Reduction Shaft	
" " 2nd " "	
" " Propeller Shaft	
Total Shaft Horse Power	
Date of Harbour Trial	
" Trial Trip	
Trials run at	
Speed on Trial	Knots. Propeller Revs. per min.
Turbine Spindles forged by	
" Wheels forged or cast by	
Reduction Gear Shafts forged by	
" Wheels forged or cast by	



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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

Diam. of 1st Reduction Pinion	}	Width	Pitch of Teeth
" 1st " Wheel			

Estimated Pressure per lineal inch

Diam. of 2nd Reduction Pinion	}	Width	Pitch of Teeth
" 2nd " Wheel			

Estimated Pressure per lineal inch

Revs. per min. of Generators at Full Power

"	"	Motors	"
"	"	1st Reduction Shaft	
"	"	2nd "	
"	"	Propellers at Full Power	

Total Shaft Horse Power

Date of Harbour Trial

" Trial Trip

Trials run at

Speed on Trial Knots. Propeller Revs. per min.

S.I.P.

Makers of Turbines

" Generators

" Motors

" Reduction Gear

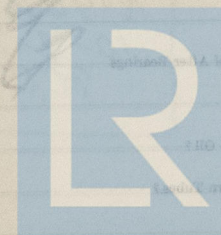
Turbine Spindles forged by

" Wheels forged or cast by

Reduction Gear Shafts forged by

" Wheels forged or cast by

DESCRIPTION OF INSTALLATION.



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SHAFTING.

Are the Crank Shafts Built or Solid?

No. of Lengths in each

Diar. by Rule

Actual

Angle of Cranks

In Way of Webs

" of Crank Pins

Length between Webs

Greatest Width of Crank Webs

Thickness

Least " "

Diar. of Keys in Crank Webs

Length

" Dowels in Crank Pins

Length

Screwed or Plain

No. of Bolts each Coupling

Diar. at Mid Length

Diar. of Pitch Circle

Greatest Distance from Edge of Main Bearing to Crank Web

Type of Thrust Blocks

No. " Rings

Diar. of Thrust Shafts at bottom of Collars

No. of Collars

" " Forward Coupling

At Aft Coupling

Diar. of Intermediate Shafting by Rule

Actual

No. of Lengths

No. of Bolts, each Coupling

Diar. at Mid Length

Diar. of Pitch Circle

Diar. of Propeller Shafts by Rule

Actual

At Coupling

Are Propeller Shafts fitted with Continuous Brass Liners?

Diar. over Liners

Length of After Bearings

Of what Material are the After Bearings composed?

Are Means provided for lubricating the After Bearings with Oil?

" " to prevent Sea Water entering the Stern Tubes?

If so, what Type is adopted?

SKETCH OF CRANK SHAFT.

Sketch of Crank Shaft showing dimensions and details. The sketch includes a central crank pin with two crank webs attached at right angles. Dimensions are noted: 10-1/2" for the crank pin diameter, 10-1/4" for the crank web thickness, and 10-1/2" for the crank web width. The sketch is signed "J. H. Jones" and dated "10-1-10".

STAMP MARKS ON SHAFTS

10-1-10
J. H. Jones

10-1-10
J. H. Jones



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No. of Blades each Propeller

Material of Blades

Diam. of Propellers

Pitch

Surface (each

S. ft.)

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

Crank Shafts Forged by

Pins

Webs

Thrust Shafts

Intermed.,

Propeller

Crank Finished by

Thrust

Intermed.,

Propeller

Fitted or Solid?

Boss

4 C.S. solid.
C.S.
10'-3" Pitch 10'-4 1/2" Surface (each 39 S. ft.)
Coefficient of Displacement of Vessel at 1/2 Moulded Depth
Crank Shafts Forged by
Pins
Webs
Thrust Shafts
Intermed.,
Propeller
Crank Finished by
Thrust
Intermed.,
Propeller

STAMP MARKS ON SHAFTS.

Crank Shaft:-

B.C.
 No 492
 6-12-29.
 R.S.

Thrust / Tail Shaft:-

B.C.
 No 942
 10-7-30
 R.S.

SKETCH OF PROPELLER SHAFT.

No. of Air Pumps

Worked by Main or Independent Engines?

No. of Circulating Pumps

Type of

Diam. of

Has each Pump a Rigid Section with Non-return Valve?

What other Pumps can circulate through Condenser?

No. of Feed Pumps on Main Engine

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

What other Pumps can feed the Boilers?

No. of Bilge Pumps on Main Engine

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

No. of Independent Bilge Pumps

What other Pumps can draw from the Bilges?

Are all Bilge Sections fitted with Valves?

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

Are all the Connections made with Valves that the Ship's Water?

Are they placed so as to be easily accessible?

Are the Discharge Pipes placed so that they keep clear of the

Is the Bilge Pump in the Bilge and easily accessible?

Are all the Bilge Pumps in the Bilge and easily accessible?

on the outside?



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BOILERS

Works No. *D. 207.*

No. of Boilers *1* Type *Cylindrical multitubular*

Single or Double-ended *single.*

No. of Furnaces in each *3*

Type of Furnaces *plain.*

Date when Plan approved *29-1-30*

Approved Working Pressure *200 lbs.*

Hydraulic Test Pressure *350 "*

Date of Hydraulic Test *7-5-30*

" when Safety Valves set *22-1-31*

Pressure at which Valves were set *206 lbs.*

Date of Accumulation Test *22-1-31*

Maximum Pressure under Accumulation Test *206 lbs.*

System of Draught *natural*

Can Boilers be worked separately? *yes.*

Makers of Plates *Steel Coy of Scotland.*

" Stay Bars *R.B. & Co. Ltd.*

" Rivets *Highland F. & Co. Ltd.*

" Furnaces *14-0"*

Greatest Internal Diam. of Boilers *10-8"*

" " Length " *1905 ft*

Square Feet of Heating Surface each Boiler *50.75 ft*

" " Grate " " *2*

No. of Safety Valves each Boiler *2* Rule Diam. *2* Actual *2*

Are the Safety Valves fitted with Easing Gear? *yes.*

No. of Pressure Gauges, each Boiler *2* No. of Water Gauges *1*

" Test Cocks " *3* " Salinometer Cocks *1*



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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? *cocks*

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

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

Diam. of Rivet Holes Pitch

No. of Rows of Rivets in Centre Circumferential Seams

Are these Seams Hand or Machine Riveted?

Diam. of Rivet Holes Pitch

No. of Rows of Rivets in Front End Circumferential Seams

Are these Seams Hand or Machine riveted?

Diam. of Rivet Holes Pitch

No. of Rows of Rivets in Back End Circumferential Seams

Are these Seams Hand or Machine Riveted?

Diam. of Rivet Holes Pitch

Size of Manholes in Shell

Dimensions of Compensating Rings

Thickness of End Plates in Steam Space Approved

" " in Boilers

Thickness of Steam Space Straps

Diam. " " Approved

" " in Boilers

Material of " "

How are Straps Secured?

Thick. and Thickness of Loose Washers on End Plates

" Riveted " "

" Double Straps " "

Thickness of Middle Back End Plates Approved

" " in Boilers

Thickness of Doublers in Wide spaces between Transverses

Pitch of Straps at

Diam. of Straps Approved

" " in Boilers

Material of " "

Are Straps fitted with Nut on outside?

Thickness of Back End Plates in Bottom

" " in Boilers

Pitch of Straps at Wide spaces between Transverses

Thickness of Doublers in

Thickness of Front End Plates in Bottom

No. of Rows of Rivets in Front End Circumferential Seams

" " in Boilers



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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 C.O. Tops

Same as for Furnace



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Diam. of Screwed Stays Approved Threads per Inch

" " " in Boilers

Material " "

Thickness of Combustion Chamber Sides Approved

" " " " in Boilers

Pitch of Screwed Stays in C.C. Sides

Diam. " " Approved Threads per Inch

" " " in Boilers

Material " "

Thickness of Combustion Chamber Backs Approved

" " " " in Boilers

Pitch of Screwed Stays in C.C. Backs

Diam. " " Approved Threads per Inch

" " " in Boilers

Material " "

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

Thickness of Combustion Chamber Bottom

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 Manifolds

VERTICAL DONKEY BOILERS

No. of Boilers
Type
Greatest Diam. Boil.
Height of Boiler Crown above the Grate
Are Boiler Crown Flats or Ribbed?
Internal Radius of Ribbed Crown
Description of Crown is Ribbed Crown
Pitch of Ribbed Crown
Height of Ribbed Crown above the Grate
Are Ribbed Crown Flats or Ribbed?
Internal Radius of Ribbed Crown
No. of Crown Stays
Diam.
Thickness of Crown at Top
Thickness of Crown at Bottom
No. of Water Tubes
Material of Water Tubes
Size of Manifold in Shell
Dimensions of Connecting Pipe
Heating Surface, each boiler
Gross Heating

SUPERHEATERS



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VERTICAL DONKEY BOILERS.

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

Diar. of Rivet Holes Pitch Width of Overlap

Height of Firebox Crowns above Fire Grate

Are Firebox Crowns Flat or Dished?

External Radius of Dished Crowns Thickness of Plates

No. of Crown Stays Diar. Material

External Diar. of Firebox at Top Bottom Thickness of Plates

No. of Water Tubes Ext. Diar. Thickness

Material of Water Tubes

Size of Manhole in Shell

Dimensions of Compensating Ring

Heating Surface, each Boiler Grate Surface

SUPERHEATERS.

Description of Superheaters

Where situated?

Which Boilers are connected to Superheaters?

Can Superheaters be shut off while Boilers are working?

No. of Safety Valves on each Superheater

Diar.

Are " fitted with Easing Gear?

Date of Hydraulic Test

Test Pressure

Date when Safety Valves set

Pressure on Valves

MAIN STEAM PIPES



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MAIN STEAM PIPES.

No. of Lengths

Material

Brazed, Welded or Seamless

Internal Diam.

Thickness

How are Flanges secured?

Date of Hydraulic Test

Test Pressure

No. of Lengths

Material

Brazed, Welded or Seamless

Internal Diam.

Thickness

How are Flanges secured?

Date of Hydraulic Test

Test Pressure

No. of Lengths

Material

Brazed, Welded or Seamless

Internal Diam.

Thickness

How are Flanges secured?

Date of Hydraulic Test

Test Pressure

1
copper.
S.D.
4" W.S.
brass.
15-1-31
400 lbs.

EVAPORATORS

Feed pump 6" x 4" x 6"
Ballast pump 6" x 6" x 6"
Air pump 6" x 6" x 6"

FEED WATER HEATERS

1
Feed water heater
15-1-31
400 lbs.

FEED WATER FILTERS

1
Feed water filter
15-1-31
400 lbs.

SUPERHEATERS



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EVAPORATORS.

No.	Type	Tons per Day
Makers		
Working Pressure	Test Pressure	Date of Test
Date of Test of Safety Valves under Steam		

FEED WATER HEATERS.

No. 1	Type	Caith, Raynor.	@
Makers			
Working Pressure	Test Pressure	Date of Test	
200 lbs.	400 lbs.	22-1-31	
	Shell 70		

FEED WATER FILTERS.

No.	Type	Size
Makers		
Working Pressure	Test Pressure	Date of Test

LIST OF DONKEY PUMPS.

Feed pump. 6" x 4" x 6"
 Ballast pump. 6" x 6" x 6"
 Air pump. Centrifugal.



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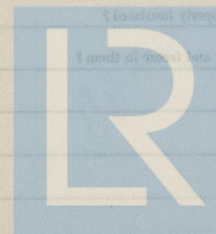
SPARE GEAR LIST

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	" L.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 Ferrules

OTHER ARTICLES OF SPARE GEAR:—

REFRIGERATORS

No. of Machines	Capacity of each
Description	
No. of Steam Cylinders and Valves	No. of Compressors
No. of Cranks	
Particulars of Pumps in connection with Refrigerating Plant and whether worked by Refrigerating Machines or Independently	



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REFRIGERATORS.

No. of Machines

Capacity of each

Makers *Gregory Heist*

Description

No. of Steam Cylinders, each Machine

No. of Compressors

No. of Cranks

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

or Independently

System of Refrigeration

Insulation

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

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

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

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

Date of Test under Working Conditions

RESULTS OF TRIALS.

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

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RECEIVED

Form for recording details of a dynamo or engine, including sections for description, capacity, current, and other technical specifications.

ELECTRIC LIGHTING.

Installation Fitted by

R. Pickersgill & Sons Ltd.

No. and Description of Dynamos

1 compound wound

Makers of Dynamos

Sunderland Forge & Eng Co Ltd

Capacity

41

Amperes, at

110

Volts,

430

Revs. per Min.

Current Alternating or Continuous

Continuous.

Single or Double Wire System

double.

Position of Dynamos

Starting platform.

Main Switch Board

No. of Circuits to which Switches are provided on Main Switch Board

4

Particulars of these Circuits:—

Circuit.	Number of Lights.	Candle Power.	Current Required Amps.	Size of Conductor.	Current Density.	Conductivity of Conductor.	Insulation Resistance per Mile.
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Form for recording details of electric lighting circuits, including sections for circuit particulars, total number of lights, and current required for motors and heaters.

Total No. of Lights

No. of Motors driving Fans, &c.

No. of Heaters

Current required for Motors and Heaters



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

Are Out-outs fitted as follows?—

On Main Switch Board, to Cables of Main Circuit.

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. 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 are not injuriously 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?

Ohms.

Is the Installation supplied with a Voltmeter?

" " " an Ampere Meter

Date of Trial of complete Installation

3-2-21

Duration of Trial

Ohms.

Have all the requirements of Section 42 been satisfactorily carried out?

yes.



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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 those were sanctioned by the Chief

Surveyor.

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.

MUROTO

as ascertained by ^{me} from personal examination

J. D. Stevenson
 Engineer Surveyor to the British Corporation for the
 Survey and Registry of Shipping.

Fees—

MAIN BOILERS.		£	s.	d.
H.S.	1908	Sq. ft.	:	:
G.S.	50.75	"	:	:
DONKEY BOILERS.				
H.S.	—	Sq. ft.	:	:
G.S.	—	"	:	:
		£	:	:
ENGINES.				
L.P.C.	16.2	Cub. ft.	:	:
		£	:	:
Testing, &c.			:	:
		£	:	:
Expenses			:	:
Total ...		£	:	:

It is submitted that this Report be approved,

J. D. Stevenson
 Chief Surveyor.

Approved by the Committee for the Class of M.B.S.* on the 18th Feb 1931
 18 FEB 1931

Fees advised

Fees paid



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 Secretary.

GENERAL CONSTRUCTION

Page-

This has been the subject of a report to the Committee on the subject of the construction of the ship.

Approved by the Committee on the subject of the construction of the ship.

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