

Apt. 17.

No. 5958

REPORT ON REFRIGERATING MACHINERY AND APPLIANCES.

(Received at London Office 28 APR 1936)

Date of writing Report 28 APR 1936 When handed in at Local Office 28 APR 1936 Port of London Greenock

No. in Reg. Book. Survey held at Greenock Date: First Survey 20.4.1936 Do. 22.4.1936 Do. 19.10.1936 No. of Visits 25

on the Refrigerating Machinery and Appliances of the S.S. PERTSHIRE Tons Gross 1219.2 Net 611.8

Vessel built at Greenock By whom built Greenock Dry Dock Co. Ltd. Yard No. 425 When built 1936

Owners The Clan Line Steamers Ltd. Port belonging to Glasgow Voyage 1

Refrigerating Machinery made by J. E. Hall Ltd. Machine No. 9446 9447 When made 1936

Insulation fitted by The Greenock Dock Co. Ltd. When fitted 1936. System of Refrigeration CO2 + Brine

Method of cooling Cargo Chambers Brine + Air Insulating Material used GRAN. CORN, SLAB CORN & SILICATE COTTON.

Number of Cargo Chambers insulated 13. Total refrigerated cargo capacity 45,000 cubic feet. 393730.

DESCRIPTION OF REFRIGERATING MACHINERY. Where placed Main dk. aft main E.R.

Refrigerating Units, No. of 2 Single, double, or triple - Cubic feet of air delivered per hour 16,920,000

Total refrigeration or ice-melting capacity in tons per 24 hours 135 Are all the units connected to all the refrigerated chambers yes

Compressors, driven direct or through ^{single} ~~double~~ reduction gearing. Compressors, single or double acting double No. of cylinders 2

Diameter of cylinders 6 1/8" Diameter of piston rod 2 3/4" Length of stroke 18" No. of strokes per minute 240 each

Motive Power supplied from Direct acting tandem compound engine

Steam Engines, high pressure, compound, or triple expansion, surface condensing. No. of cylinders 4 Diameter 2-H.P. 12" 2-L.P. 24"

Length of stroke 18" Working pressure 120 lbs sq. in. Diameter of crank shaft journals and pins 7 1/2" journals, 8" pins

Breadth and thickness of crank webs 11" x 6" No. of sections in crank shaft one each machine Revolutions of engines per minute 135.

Oil Engines, type 2 or 4 stroke cycle Single or double acting B.H.P.

No. of cylinders Diameter Length of stroke Span of bearings as per Rule

Maximum pressure in cylinders Diameter of crank shaft journals and pins

Breadth and thickness of crank webs No. of sections in crank shaft Revolutions of engine per minute

Electric Motors, type No. of Rated Kilowatts

Volts at revolutions per minute. Diameter of motor shafts at bearings

Reduction Gearing, maximum shaft horse power at 1st pinion Revolutions per minute at full power at 1st pinion

2nd pinion 1st reduction wheel main shaft Pitch circle diameter, 1st pinion 2nd pinion

1st reduction wheel Main wheel Width of face, 1st reduction wheel Main wheel

Distance between centres of pinion and wheel faces and the centre of the adjacent bearings, 1st pinion 2nd pinion

1st reduction wheel Main wheel Flexible pinion shafts, diameter 1st 2nd

Pinion shafts, diameter at bearings, External, 1st 2nd Internal, 1st 2nd

Diameter at bottom of teeth of pinion, 1st 2nd Wheel shafts, diameter at bearings, 1st

Main Diameter at wheel shroud, 1st Main

Gas Condensers, No. of 2 Cast iron or steel casings cast iron Cylindrical or rectangular cylindrical

No. of coils in each 16 Material of coils S.D. Copper 3/4" b. x 1" od. Can each coil be readily shut off or disconnected yes.

Water Circulating Pumps, No. and size of 2-6" centrifugal how worked Steam Gas Separators, No. of

Gas Evaporators, No. of 2 Cast iron or steel casings Steel Pressure or gravity type pressure

No. of coils in each casing 14 Material of coils S.D. Steel 1 1/2" b. x 1 5/16" od. Can each coil be readily shut off or disconnected yes.

Direct Expansion or Brine Cooled Batteries, No. of 9 twin Are there two separate systems, so that one may be in use while the other is being

cleared of snow yes No. of coils in each battery See below Material of coils S.D. Steel 1 1/2" b. x 4 1/4" Can each coil be readily shut off or

disconnected yes Total cooling surface of battery coils 14,800 sq. ft. Is a watertight tray fitted under each battery yes

Air Circulating Fans, Total No. of 18 each of See separate list cubic feet capacity, at revolutions per minute

Steam or electrically driven electrically Where spare fans are supplied are these fitted in position ready for coupling up no

Brine Circulating Pumps, No. and size of, including the additional pump 2-6" x 4" x 10" V.D. how worked Steam direct

Brine Cooling System, closed or open closed Are the pipes and tanks galvanised on the inside no

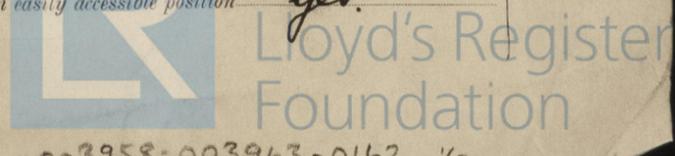
* No. of brine sections in each chamber 1 Tw. dk. Port = 2G, 1 Tw. dk. Starb = 2G, 2 UTw. dk. {5G, 2 LTw. dk. {5G, 2 Hold {4G, 3 UTw. dk. {4G, 3 LTw. dk. {4G, 4 UTw. dk. {6G, 4 LTw. dk. {6G, 4 Hold {8G, 3 HOLD {8G.

Can each section be readily shut off or disconnected yes. Are the control valves situated in an easily accessible position yes.

* G indicates grid sections C " Cooler "

NOTE.—THE WORDS WHICH DO NOT APPLY SHOULD BE DELETED.

Im. 6. 31.—T.



Common
 Are thermometers fitted to the outflow and to each return brine pipe yes. Where the tanks are closed are they ventilated as per Rule yes
 Where the tanks are not closed is the compartment in which they are situated efficiently ventilated yes

Steam Condensing Plant. State what provision is made for condensing steam, in terms of Section 4, Clauses 13 and 14
When at Sea, Each machine exhausts into its own separate surface Condenser
When in port, machines exhaust to main and auxiliary condensers

HYDRAULIC AND OTHER TESTS.

DESCRIPTION.	Date of Test.	Working Pressure.	Hydraulic Test Pressure.	Air Test Pressure.	Stamped.	REMARKS.
1 - H.P. L.P.	25-2-36	40 lb	H.P. 350 lb	L.P. 250 lb	Pl.	
ENGINE CYLINDERS (IF TESTED)	1 - H.P. 14-3-36 1 - L.P. 24-2-36	120 lb	250 lb	150 lb	Pl.	
GAS COMPRESSORS	2-4-36	100 lb	300 lb	150 lb	Pl.	
" SEPARATORS	2-4-36	do.	do.	do.	Pl.	
" CONDENSER COILS	25-2-36 4-2-36	do.	do.	do.	Pl.	
" EVAPORATOR COILS	24-4-36 6-3-36	do.	do.	do.	Pl.	
" CONDENSER HEADERS AND CONNECTIONS	19-3-36 2-4-36	do.	do.	do.	Pl.	
" CONDENSER CASINGS	24-3-36	5 to 10 lb	30 lb		Pl.	
" EVAPORATOR CASINGS	20-4-36	do.	do.		Pl.	
NH ₃ CONDENSER, EVAPORATOR AND AIR COOLER COILS AFTER ERECTION IN PLACE	30-9-36	100 lb	300 lb	150 lb	Pl.	
BRINE PIPING AFTER ERECTION IN PLACE	30-9-36	100 lb	300 lb	150 lb	Pl.	

Cooling Test. Has the refrigerating machinery been examined under full working conditions, and found satisfactory yes
 Dates of test 15-16-10-36 Density of Brine 48° by Swadwell's hydrometer
 Temperatures (when the cargo chambers are cooled down to the required test temperatures) of air at the snow box and of the return air yes & yes
 or, delivery and return air at 3° F. & 5° F., outflow and return brine -8° F. & -6° F.
 atmosphere 58° F. cooling water inlet and discharge 53° F. & 59° F. gas in condensers 78° F. and evaporators -10° F.
 the average temperature of the refrigerated chambers 4° F. and the rise of temperature in these chambers upon the expiration of 12 hours
 time after the machinery and cooling appliances have been shut off 10 Fahrenheit degrees.

SPARE GEAR.

Are the machines in accordance with Section 4, Clause 2 of the Rules yes
 Are the working parts of the machines, pumps and motors respectively, interchangeable yes

ARTICLES SUPPLIED AS PER RULE.

ADDITIONAL SPARE GEAR SUPPLIED.

1 Crankshaft
 1 Steam piston rod and nuts 12-lb gland leathers
 1 piston for H.P. cyls with rings 12- " piston do.
 1 set piston rings for H.P. & L.P. cyls.
 1 set rings for each comp. piston
 2 piston rods for compressors with rings
 1 bucket & rod for air pump
 1 impeller & spindle for water pump, 1 set pump bushes
 1 piston & rod with rings for water pump engine
 1 pair X-head brasses & bolts do. do. do.
 1 pair crankpin do. do. do.
 1 H.P. piston slide valve, 1 H.P. piston valve spindle & nuts
 1 eccentric strap, rod & brasses, each pattern
 1 addl. brine pump fitted in engine room
 2 bolts & nuts for main bearings
 2 do. do. conn. rod big end, 1 regulator valve spindle
 2 do. do. crosshead, 1 CO₂ stop valve spindle each size
 1 set valves for air pump, 1 set valve for fast pump.
 1 set valves for brine pump for each size
 1 set of 2 leather moulds, 6 tubes & 4 ferrules for steam condenser
 3 lengths each 1/4" & 1/2" W.I. piping, 12 W.I. sockets & backnuts
 3 W.I. bends each 1/4" & 1/2" W.I. each size 1/2" & 1/2"
 2 pairs of CO₂ pipe flanges. Sundry brass cocks & valves.
 Assorted bolts & nuts
 2 sets copper joint rings for compressor - 2 sets special metal do. for other joints. rings for each comp. gland.
 1 do. do.

2 sets of valves & springs for compressor
 12 addl. springs for 1 compressor
 1 guide for grinding in comp. valves
 1 set valve springs for brine pumps
 1 bucket & rod with rings for brine pump
 1 piston rod & rings for each size
 2 springs for water relief valve.
 2 do. brine do. do.
 2 do. CO₂ safety do. do.
 2 bolts & nuts for comp. coupling
 1 pump for pressure bulb
 1 CO₂ pressure gauge.
 1 hydrometer
 2 brass cases thermometers
 12 copper safety discs.
 1-1/8" CO₂ gauge valve and
 3 spare pipes.
 1 fitted box for comp. parts.

ELECTRICAL SPARES FOR FAN MOTORS.

1 spare motor { 40" fans
35" " }
 1 set control spares { 30" - 6 3/4" H.P. fans
30" - 5 3/4" H.P. " }
 22 1/2" fans.

Motors are interchangeable for either internal or external type of fan motor for each of their respective sizes.

ARTICLES REQUIRED BY RULES AND NOT YET SUPPLIED

The foregoing is a correct description of the Refrigerating Machinery.

J. & E. HALL, LTD. Manufacturer.
 Chichester
 DIRECTOR

DESCRIPTION OF INSULATION.

BULKHEADS.	IN LOWER HOLD CHAMBERS.					IN 'TWEEN DECK CHAMBERS.				
	Air Space.	Outer Lining.	Non-conducting Material.	Thickness of ditto.	Inner Lining.	Air Space.	Outer Lining.	Non-conducting Material.	Thickness of ditto.	Inner Lining.
FRAME No. 154 (Easo-Deck)						NONE	1" T.O.G.	GRAN. CORR.	10"	1" T.O.G.
FRAME No. 147	F						NONE		5 1/2"	
	A	NONE	NONE	GRAN. CORR.	10"	1" T.O.G.			10"	1 1/2"
FRAME No. 112	F								7 1/2"	
	A								12"	1 1/2"
FRAME No. 96	F							SIL. COTTON	12"	12"
	A									
FRAME No. (Boiler Room)	F									
	A									
FRAME No. 55 (Engine Room)	A	NONE	NONE	SIL. COTTON	1 1/2" - 1 1/2"	1" T.O.G.				
FRAME No. 29	F									
	A									
FRAME No. 60	F									
	A									
FRAME No. 52	F									
	A									
FRAME No. 25 (Easo-Deck)	F									
	A									
SIDES		NONE	NONE	GRAN. CORR.	1 1/2"	1 1/2" T.O.G.			10 1/2"	10"
OVERHEADING									12 1/2"	10 1/2"
FLOORS OF CHAMBERS		2"	1" T.O.G.	SLAB CORR.	6"	2-1/2" T.O.G.				
HOLDS.										
TRUNK HATCHWAYS		NONE								See 2 aft divisional bulkheads (B)
THRUST RECESS, SIDES AND TOP										See 1st divisional bulkhead
TUNNEL SIDES AND TOP										See air space 6' from each side
TUNNEL RECESS, FRONT AND TOP										1" T.O.G. lining.

FRAMES OR REVERSE FRAMES, FACE UNDER INSULATION.
 BULKHEAD STIFFENERS, TOP UNDER INSULATION. BOTTOM UNDER INSULATION. AND FACE UNDER INSULATION.
 RIBBAND ON TOP OF DECKS 5 x 2 1/2" R.P. BEADED IN NAPOID.
 SIDE STRINGERS, TOP BOTTOM AND FACE
 WEB FRAMES, SIDES AND FACE
 BRACKETS, TOP BOTTOM AND FACE
 INSULATED HATCHES, MAIN 6' SLAB CORR. 1" T.O.G. 8" PLUG. BILGE 6' SLAB CORR. 10 1/2" T.O.G. MANHOLE 6' SLAB CORR. 10 1/2" T.O.G.
 HATCHWAY COAMINGS, MAIN 1" P. VARIOUS DEPTHS 6" THICK. BILGE 8 1/2" x 5 1/2" TO 2 1/2" R.P.
 HOLD PILLARS 2" GRAN. CORR. 1 1/2" CHECK LINING.
 MASTS 4" GRAN. CORR. 1" T.O.G. VENTILATORS 4" GRAN. CORR. 1" T.O.G.
 Are insulated plugs fitted to provide easy access to bilge suction roses yes. tank, air, and sounding pipes yes. heels of pillars yes.
 and manhole doors of tanks yes. Are insulated plugs fitted to ventilators yes. cargo ports yes and side lights yes
 Is the insulation of the lower hold floor and tunnel top in way of the hatchways protected yes. if so, how BY 2" L.I.P.

Oil Storage Tanks, where adjacent to the insulated chambers, state what provision has been made for ventilating the air space between the insulation and the bulkhead plating COFFER DAM FITTED.
 Coal Bunker Bulkheads, and Brine Outflow and Return Pipes passing through coal bunkers. Is the insulation, so far as practicable, fireproof yes.
 Where Cooling Pipes pass through watertight bulkheads or deck plating, are the fittings and packing of the stuffing boxes both watertight and fireproof yes.
 Cargo Battens, Dimensions and spacing, sides { HOLD 2 x 2 0 17" W.I. floors { 2 x 3" IN HOLDS.
 { 2 x 2" IN TH. DECKS tunnel top 2 x 2" (PORTABLE)
 { 2 x 2" IN TH. DECKS (PORTABLE.)
 fixed or portable AS STATED. Are screens fitted over the brine grids at chamber sides yes hinged or permanently fixed yes
 Thermometer Tubes, No. and position in each chamber { H-2 HOLD 2 1/2" DIA. 2 CENTRAL 2 ATT. 2 1/2" DIA. { H-3 HOLD 2 FOR 2 ATT. 2 1/2" DIA.
 { H-4 HOLD 2 1/2" DIA. 2 1/2" DIA. 2 1/2" DIA. { H-5 HOLD 2 1/2" DIA. 2 1/2" DIA. 2 1/2" DIA.
 { H-6 HOLD 2 1/2" DIA. 2 1/2" DIA. 2 1/2" DIA. { H-7 HOLD 2 1/2" DIA. 2 1/2" DIA. 2 1/2" DIA.
 { H-8 HOLD 2 1/2" DIA. 2 1/2" DIA. 2 1/2" DIA. { H-9 HOLD 2 1/2" DIA. 2 1/2" DIA. 2 1/2" DIA.
 are they fitted in accordance with Section 3, Clause 8 yes.
 Protection of Pipes. Are all pipes, including air and sounding pipes, which pass through or into insulated chambers, well insulated yes.
 Draining Arrangements. Where the chambers are situated below the load water line, what provision is made for draining the inside of the chambers
 TRAPPED SCUPPERS TO BILGE. Where sluices, scupper pipes, and drain pipes are fitted are means provided for blanking them off yes.
 What provision is made for draining the refrigerating machinery room SCUPPER TO BILGE.
 brine return room SCUPPER TO BILGE. fan room SCUPPER TO BILGE. water circulating pump room IN ENGINE ROOM.
 Are all air spaces behind insulation arranged to drain to the bilges, bilge wells, or gutterways of the respective chambers yes

Sounding Pipes, No. and position in each chamber situated below the load water line *1 P.S. N.N. 20 3 HOLDS. 1 P.S. & 1 RETN. PIPE IN N.4 HOLD.*
 Diameter *2 1/2" & 1 1/2" AS APPROVED*. Are all sounding pipes in way of insulated chambers fitted in accordance with Section 3, Clause 11 *YES*.
 Are all wood linings tongued and grooved *YES*. Are cement facings reinforced with expanded steel lattice *✓*
 How is the expanded metal secured in place *✓*
 How are the cork slabs secured *to the steel structure of the vessel FITTED IN SQUARES REMOVED BY 6x2 WOOD CROWNS.*
Air Trunkways in Chambers, inside dimensions, main *VARYING 11'0" x 1'1" TO 8'0" x 2'8"* and branch *21" x 4 1/2" TO 18" x 4"*
 Are they permanently fixed or collapsible, or portable. *PERMANENT.* State position in chambers *ROUND WALLS.*

Where air trunkways pass through watertight bulkheads, are they fitted with watertight doors *✓* Are the door frames efficiently insulated *✓*
 Are insulated plugs supplied for the doorways *✓* Where are the doors worked from *✓*

Cooling Pipes in Chambers, diameter *1 1/2" & 1 1/4"* Are they galvanised externally *YES.*
 How are they arranged in the chambers *Roof grids in all spaces: side & end grids also in cheese rooms.*

Thawing Off, what provision is made for removing the snow from the cooling pipes in the chambers *Brine heaters in refrigerating engine room.*

The foregoing is a correct description of the Insulation and Appliances. **THE GREENOCK DOCKYARD CO. LTD**
K. MacInnes SECRETARY Builders.

Plans. Are approved Plans or Specifications forwarded herewith for the Refrigerating Machinery *✓* and Insulation *Yes 7 in No.*
 (If not, state date of approval)
 Is the Refrigerating Machinery and Appliances duplicate of a previous case? *NO. If so, state name of vessel T.S.S. "PERTHSHIRE"*
 If the survey is not complete, state what arrangements have been made for its completion and what remains to be done *Complete.*

General Remarks (State quality of workmanship, opinions as to class, &c.) *The refrigerating machinery has been constructed under special survey and the materials and workmanship are good and will be eligible for the notation + Lloyd's R.M.C. (with date) when the installation and testing have been satisfactorily completed.*

These refrigerating appliances have been properly fitted on board, tried under working conditions & found satisfactory - results of insulation test are embodied in this report.

The vessel's refrigerating installation is eligible in my opinion to be classed in the Register Book with record - & Lloyd's R.M.C. - 10-36.

It is submitted that this vessel is eligible for THE RECORD. & Lloyd's R.M.C. 10-36
D.G. 25/10/36.

PARTICULARS TO BE ENTERED IN REGISTER BOOK.

REFRIGERATING MACHINES.					System of (1) Refrigerating (2) Insulating the Chambers.	POWER.		INSULATED CARGO CHAMBERS.	
No. of Units.	No. of Compressors.	System.	Makers.	Date of Construction.		Cubic feet of air delivered per hour.	Ice melting capacity per 24 hours. Tons.	No.	Capacity. Cubic ft.
2	2	Casblunby	J. E. Hall Ltd.	1936	(CO ₂ + Roric) (1) G. Lark	16,920,000	135	#	445,000 13. 393,730.

Fee *£24-0-0* Fee applied for *25 APR 1936 (1/2 hr)*
 Travelling Expenses *£36* Received by me *23rd Oct 1936*
£25-1/- pd 28.12.36
 Late attendance *1/2 hr for etc*
 Committee's Minute *FRI. 23 OCT 1936*

D. Gemmell
 Surveyor to Lloyd's Register.
H. J. Swinton
J. Boyle

Assigned *+ Lloyd's R.M.C. 10, 36*

