

# REPORT ON REFRIGERATING MACHINERY AND APPLIANCES.

(Received at London Office *17.4.40*)

Date of writing Report *4<sup>th</sup> April 1940* When handed in at Local Office *11<sup>th</sup> April 1940* Port of *Greenock*

No. in Reg. Book. Survey held at *Greenock* Date: First Survey *17<sup>th</sup> Oct. 1939* Last Survey *5-4-40* 19 *39917 597* (No. of Visits *23*)

on the Refrigerating Machinery and Appliances of the *S.S. "LANARKSHIRE"* Tons *5816* Gross *5812* Net

Vessel built at *Greenock* By whom built *The Gov. Dock Co. Ltd. Yard No. 437* When built *1940*

Owners *Scottish Shipping Co. Ltd.* Port belonging to *Glasgow* Voyage

Refrigerating Machinery made by *J. E. Hall & Co.* Machine No. *10284* When made *1939*

Insulation fitted by *The Gov. Dock Co. Ltd.* When fitted *1940* System of Refrigeration *CO<sub>2</sub> BRINE*

Method of cooling Cargo Chambers *Brine & Air* Insulating Material used *gran. cork, slab cork & silicate cotton*

Number of Cargo Chambers insulated *14* Total refrigerated cargo capacity *318,000* cubic feet.

## DESCRIPTION OF REFRIGERATING MACHINERY. Where placed

Refrigerating Units, No. of \_\_\_\_\_ Single, double, or triple \_\_\_\_\_ Cubic feet of air delivered per hour \_\_\_\_\_

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

Compressors, driven direct or through <sup>single</sup>/<sub>double</sub> } reduction gearing. Compressors, single or double acting \_\_\_\_\_ No. of cylinders \_\_\_\_\_

Diameter of cylinders \_\_\_\_\_ Diameter of piston rod \_\_\_\_\_ Length of stroke \_\_\_\_\_ No. of strokes per minute \_\_\_\_\_

Motive Power supplied from *Three Babcock & Wilcox boilers*

Steam Engines, high pressure, compound, or triple expansion, surface condensing. No. of cylinders \_\_\_\_\_ Diameter \_\_\_\_\_

Length of stroke \_\_\_\_\_ Working pressure \_\_\_\_\_ Diameter of crank shaft journals and pins \_\_\_\_\_

Breadth and thickness of crank webs \_\_\_\_\_ No. of sections in crank shaft \_\_\_\_\_ Revolutions of engines per minute \_\_\_\_\_

Oil Engines, type \_\_\_\_\_ 2 or 4 stroke cycle \_\_\_\_\_ Single or double acting \_\_\_\_\_

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 \_\_\_\_\_ Cast iron or steel casings \_\_\_\_\_ Cylindrical or rectangular \_\_\_\_\_

No. of coils in each \_\_\_\_\_ Material of coils \_\_\_\_\_ Can each coil be readily shut off or disconnected \_\_\_\_\_

Water Circulating Pumps, No. and size of \_\_\_\_\_ how worked \_\_\_\_\_ Gas Separators, No. of \_\_\_\_\_

Gas Evaporators, No. of \_\_\_\_\_ Cast iron or steel casings \_\_\_\_\_ Pressure or gravity type \_\_\_\_\_

No. of coils in each casing \_\_\_\_\_ Material of coils \_\_\_\_\_ Can each coil be readily shut off or disconnected \_\_\_\_\_

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

cleared of snow \_\_\_\_\_ No. of coils in each battery \_\_\_\_\_ Material of coils \_\_\_\_\_ Can each coil be readily shut off or

disconnected \_\_\_\_\_ Total cooling surface of battery coils \_\_\_\_\_ Is a watertight tray fitted under each battery \_\_\_\_\_

Air Circulating Fans, Total No. of \_\_\_\_\_ each of \_\_\_\_\_ cubic feet capacity, at \_\_\_\_\_ revolutions per minute \_\_\_\_\_

Steam or electrically driven \_\_\_\_\_ Where spare fans are supplied are these fitted in position ready for coupling up \_\_\_\_\_

Brine Circulating Pumps, No. and size of, including the additional pump \_\_\_\_\_ how worked \_\_\_\_\_

Brine Cooling System, closed or open \_\_\_\_\_ Are the pipes and tanks galvanised on the inside \_\_\_\_\_

No. of brine sections in each chamber \_\_\_\_\_

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

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

*Handwritten notes:*  
Babcock & Wilcox No. 830  
This is the main engine  
The condenser is of the  
type



© 2020 Lloyd's Register Foundation

003242-003289-0073

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

Condensers in Refrigerating engine room

HYDRAULIC AND OTHER TESTS.

Table with columns: DESCRIPTION, Date of Test, Working Pressure, Hydraulic Test Pressure, Air Test Pressure, Stamped, REMARKS. Rows include ENGINE CYLINDERS, GAS COMPRESSORS, SEPARATORS, CONDENSER COILS, EVAPORATOR COILS, CONDENSER HEADERS AND CONNECTIONS, CONDENSER CASINGS, EVAPORATOR CASINGS, NH3 CONDENSER, EVAPORATOR AND AIR COOLER COILS, BRINE PIPING AFTER ERECTION IN PLACE.

Cooling Test. Has the refrigerating machinery been examined under full working conditions, and found satisfactory Yes. Dates of test 27<sup>th</sup> 28<sup>th</sup> March '40 Density of Brine 47 by Samuel 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 ✓ & ✓, or, delivery and return air at direct expansion brine cooled batteries 1.7° & 3.9°, outflow and return brine -7 1/2 & -4 atmosphere 41° cooling water inlet and discharge 45° & 49° gas in condensers 63 and evaporators -17. The average temperature of the refrigerated chambers 4.29 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 7.088°

SPARE GEAR.

Table with columns: ARTICLES SUPPLIED AS PER RULE, ADDITIONAL SPARE GEAR SUPPLIED. Rows are mostly blank.

ARTICLES REQUIRED BY RULES AND NOT YET SUPPLIED

The foregoing is a correct description of the Refrigerating Machinery.

Manufacturer.

DESCRIPTION OF INSULATION.

Table with columns: IN LOWER HOLD CHAMBERS, IN 'TWEEN DECK CHAMBERS. Rows include FRAME No. (Fore Peak), FRAME No. 151, FRAME No. 117, FRAME No. 101, FRAME No. 96 (Boiler Room), FRAME No. 69 (Engine Room), FRAME No. 53, FRAME No. 27, FRAME No., FRAME No. (After Peak), SIDES, OVERHEADING, FLOORS OF CHAMBERS, TRUNK HATCHWAYS, THRUST RECESS, SIDES AND TOP, TUNNEL SIDES AND TOP, TUNNEL RECESS, FRONT AND TOP.

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 1/2" R.P. cant bedded in Mafoid. SIDE STRINGERS, TOP ✓ BOTTOM ✓ AND FACE ✓. WEB FRAMES, SIDES ✓ AND FACE ✓. BRACKETS, TOP ✓ BOTTOM ✓ AND FACE ✓. INSULATED HATCHES, MAIN 6' slab cork, 1" o.g. 8' flag. BILGE 6' slab cork 2 1/2" flag. MANHOLE 4' slab cork 1 1/2" flag. HATCHWAY COAMINGS, MAIN 1 1/2" o.g. various depths BILGE 1 1/2" o.g. 9' deep by 6 x 3. HOLD PILLARS 2" iron cork. 1 1/2" cherted lining. MASTS ✓ VENTILATORS ✓. Are insulated plugs fitted to provide easy access to bilge suction roses Yes. tank, air, and sounding pipes ✓ heels of pillars (welded) and manhole doors of tanks Yes. Are insulated plugs fitted to ventilators ✓ cargo ports ✓ and side lights ✓. Is the insulation of the lower hold floor and tunnel top in way of the hatchways protected Yes if so, how by 2" elm. 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 Deep coffers between oil fuel cross bulkheads & insulated chambers. Coal Bunker Bulkheads, and Brine Outflow and Return Pipes passing through coal bunkers. Is the insulation, so far as practicable, fireproof ✓. 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 None fitted floors 3 1/2" in hold 2 1/2" in lower deck tunnel top 3 1/2", 10' off pipes fixed or portable as stated Are screens fitted over the brine grids at chamber sides ✓ hinged or permanently fixed ✓. Thermometer Tubes, No. and position in each chamber { N° 2 HOLD, 2 FOR, 2 CENT, 2 ATT. N° 3 HOLD, 2 FOR, 2 ATT. N° 4 L.T.D. 2 - 2 - 2 - N° 5 L.T.D. 3 - 2 CENT, 3 ATT. N° 6 HOLD, 2 FOR, 2 ATT. N° 7 HOLD, 2 L.C. 30. ALL 2 1/2" DIA. N° 8 L.T.D. 2 - 2 CENT, 2 ATT. N° 9 L.T.D. 3 1/2" 20. 30. 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 Drapped scupper to bilges. 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 3/4" scupper to C.R. bilge with leaded cork in C.R. brine return room 3/4" scupper to C.R. bilge rooms 2" scupper to duct water circulating pump room have a bilge. Are all air spaces behind insulation arranged to drain to the bilges, bilge wells, or gutterways of the respective chambers ✓



N° 2 HOLD. 1 P.S. 2 1/2 DIA.	N° 3 HOLD. 1 P.S. 2 1/2 DIA.	N° 4 HOLD. 1 P.S. 1 1/2 DIA.	N° 5 HOLD. 1 C CENTRE. 1 1/2 DIA.
------------------------------------	------------------------------------	------------------------------------	---

Sounding Pipes, No. and position in each chamber situated below the load water line  
 Diameter 2 1/2 & 1 1/2 as fitted. 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 Sitted in squares bounded by 6x2 grounds & bedded in joint.

Air Trunkways in Chambers, inside dimensions, main Various and branch Various.  
 Are they permanently fixed or collapsible, or portable Permanent State position in chambers Round walls & under roof.

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" Are they galvanised externally Yes  
 How are they arranged in the chambers Grids

Thawing Off, what provision is made for removing the snow from the cooling pipes in the chambers Brine heater in refrigerator engine room

The foregoing is a correct description of the Insulation and Appliances. THE GREENOCK DOCKYARD CO. LTD  
Neil Macdonald SECRETARY Builders.

Plans. Are approved Plans or Specifications forwarded herewith for the Refrigerating Machinery and Insulation Yes, 2 in N°  
 (If not, state date of approval)  
 Is the Refrigerating Machinery and Appliances duplicate of a previous case No If so, state name of vessel ✓  
 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 appliances have been efficiently installed on board, tried out under full working conditions, with satisfactory results  
The materials & workmanship are good. The installation is eligible in our opinion to be classed in the Society's Register Book with record + LLOYDS R.M.C 4-40 (in Red) as recommended in London R.M.C report N° 830.

It is submitted that this vessel is eligible for THE RECORD, + Lloyds R.M.C 4.40.  
 At this survey the brine pipes have been satisfactorily tested to 75 lbs per square inch over the working pressure at the time.  
15/4/40  
 CERTIFICATE WRITTEN

PARTICULARS TO BE ENTERED IN REGISTER BOOK.

No. and whether Single or Duplex.	Makers.	Date of Construction.	System.	Type.	System of (1) Refrigerating (2) Insulating the Chambers.	POWER.		INSULATED CARGO CHAMBERS.	
						Cubic feet of air delivered per hour.	Ice melting capacity per 24 hours. Tons.	No.	Capacity.
2	J & C Hall & Co	1939	CO2	Halls	Brine & Air Green. Slab Cork		117	14	318,000.

London 9 - -  
 Fee ... Greenock £18 - - - (Fee applied for, 11<sup>th</sup> APRIL 1940.  
 Travelling Expenses £ 1 : 1 : 0 (Received by me, 6-5-1940)  
TUE 16 APR 1940  
 Committee's Minute 8  
N. L. Swinton & Charles J. Humber  
 Surveyors to Lloyd's Register.

Assigned + Lloyds R.M.C 4.40



Certificate to be sent to Greenock Office