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REPORT ON REFRIGERATING MACHINERY AND APPLIANCES.

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No. in Reg. Book. Survey held at 36612 Date: First Survey 25 September 1933 Last Survey 30 October 1933

on the Refrigerating Machinery and Appliances of the S.S. 'ANGOL' [EX TORR HEAD] Tons Gross 5221 Net 3161

Vessel built at Belfast By whom built Workman Clark & Co. Ltd. Ward No. When built 1923-5

Owners Cia Chilena de Nav Interocanica Port belonging to Voyage

Refrigerating Machinery made by J. & E. Hall Ltd Machine No. 8893 When made 1933

Insulation fitted by Lamell, Laird & Co. Ltd. When fitted 1933 System of Refrigeration CO2

Method of cooling Cargo Chambers Air Cooled Insulating Material used granulated cork

Number of Cargo Chambers insulated 2 Total refrigerated cargo capacity 24760 cubic feet.

DESCRIPTION OF REFRIGERATING MACHINERY. Where placed Aft end main E.R. Stbd side

Refrigerating Units, No. of one Single, double, or triple 4cs Cubic feet of air delivered per hour

Total refrigeration or ice-melting capacity in tons per 24 hours 9 1/2 Are all the units connected to all the refrigerated chambers

Compressors, driven direct or through single or double reduction gearing. Compressors, single or double acting double No. of cylinders one

Diameter of cylinders 3 1/2" Diameter of piston rod 1 5/8" Length of stroke 9" No. of strokes per minute 240

Motive Power supplied from Steam engine through two throw crankshaft

Steam Engines, high pressure, compound, or triple expansion, surface condensing. No. of cylinders one Diameter 12"

Length of stroke 9" Working pressure 200 lbs. Diameter of crank shaft journals and pins 5"

Breadth and thickness of crank webs 4" x 3 1/4" No. of sections in crank shaft one 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 one Cast iron or steel casings cast iron Cylindrical or rectangular rectangular

No. of coils in each 3 Material of coils S.D. Copper 3/4" x 10" o.d. Can each coil be readily shut off or disconnected yes

Water Circulating Pumps, No. and size of 1 - 5" x 6" x 6" V.D. how worked Steam direct Gas Separators, No. of 2

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

No. of coils in each casing 2 Material of coils S.D. Steel 1" x 1 1/2" o.d. Can each coil be readily shut off or disconnected yes

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

cleared of snow no No. of coils in each battery 3 Material of coils S.D. Steel 1 1/2" bore Can each coil be readily shut off or

disconnected yes Total cooling surface of battery coils 920 sq. feet per min Is a watertight tray fitted under each battery yes

Air Circulating Fans, Total No. of one each of 8,900 cubic feet capacity, at 1800 revolutions per minute

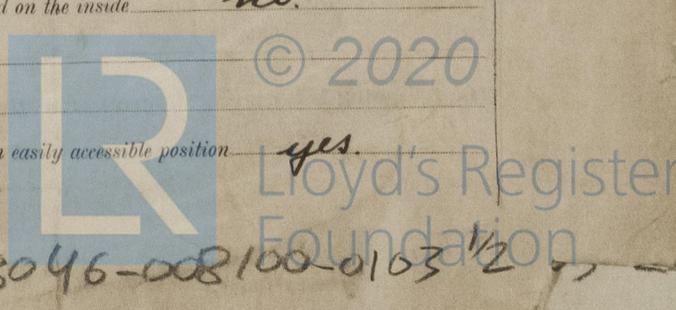
Steam or electrically driven electrically Where spare fans are supplied are these fitted in position ready for coupling up no

Brine Circulating Pumps, No. and size of, including the additional pump 2 - 4 1/2" x 5" x 6" V.D. how worked Steam direct

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

No. of brine sections in each chamber air cooling only

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



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Are thermometers fitted to the outflow and to each return brine pipe yes. Where the tanks are closed are they ventilated as per Rule
 Where the tanks are not closed is the compartment in which they are situated efficiently ventilated 415
 Steam Condensing Plant. State what provision is made for condensing steam, in terms of Section 4, Clauses 13 and 14 to auxiliary exhaust line

HYDRAULIC AND OTHER TESTS.

DESCRIPTION.	Date of Test.	Working Pressure.	Hydraulic Test Pressure.	Air Test Pressure.	Stamped.	REMARKS.
ENGINE CYLINDERS (IF TESTED)	26-10-33		350lb. D			
GAS COMPRESSORS	30-10-33	1000lb. D	3000lb. D	1500lb. D	OK	
" SEPARATORS	30-10-33	do	do	do	OK	
" CONDENSER COILS	26-10-33 20-10-33	do	do	do	OK	
" EVAPORATOR COILS	20-10-33	do	do	do	OK	
" CONDENSER HEADERS AND CONNECTIONS	30-10-33	do	do	do	OK	
" CONDENSER CASINGS	30-10-33	5 to 10 lb	20 lb		OK	
" EVAPORATOR CASINGS	open top					
NH ₃ CONDENSER, EVAPORATOR AND AIR COOLER COILS AFTER ERECTION IN PLACE	✓					
BRINE PIPING AFTER ERECTION IN PLACE	22-11-33	20 lb. D		90 lb. D	✓	

Cooling Test. Has the refrigerating machinery been examined under full working conditions, and found satisfactory yes
 Dates of test 27, 28/11/33. Density of Brine 46° by Lucas 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 or brine cooled batteries 1° & 13°, outflow and return brine -12° & -6 1/2°
 atmosphere 4 1/2° cooling water inlet and discharge 54 1/2° & 57 1/2° gas in condensers 63 1/2° and evaporators -16 1/2°
 the average temperature of the refrigerated chambers 15° and the rise of temperature in these chambers upon the expiration of 19 hours
 time after the machinery and cooling appliances have been shut off 15°

SPARE GEAR.

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

ARTICLES SUPPLIED AS PER RULE.

ADDITIONAL SPARE GEAR SUPPLIED.

- 1 Crankshaft
 - 1 Steam piston rod & nut with rings
 - 1 piston & rod complete with rings for compressor.
 - 1 pair main bearings
 - 1 pair conn. rod brasses
 - 1 pair x-head brasses
 - 1 piston slide valve spindle with nuts.
 - 1 ecc. sheave with strap rod & brasses.
 - 1 bucket and rod for water pump.
 - 1 addl. brine pump in E.R.
 - 2 bolts & nuts for main bearing
 - 2 " " conn. rod big end.
 - 2 " " steam engine crosshead.
 - 1 set of 4 valves seats & springs for compressor.
 - 1 set of valves for water pump
 - 1 set of valves for brine pump
 - 1 set of 2 leather moulds.
 - 3 lengths 2 1/2" W.I. pipe
 - 3 heads 2 1/2" pipe
 - 6 2 1/2" sockets & backnuts
 - 2 pair CO₂ pipe flanges.
 - 1 set ratchet screwing dies for 2 1/2" pipe
 - 1 regulator valve spindle
 - Sundry brass cocks
 - assorted bolts & nuts
 - 6 lubricator piston leathers.
 - 6 do. gland do.
 - 2 sets copper joint rings for compr. joints.
 - 1 set do. do. for other joints.
 - 2 sets special metal rings for compr. gland.
- 8 addl. springs for compr. valves
 - 2 guides for grinding intake valves
 - 1 set springs for water pump valves
 - 1 do. do. brine do. do.
 - 1 do. do. do. do. do.
 - 1 set steam piston rings for water pump.
 - 1 do. do. do. brine pump
 - 2 springs for water relief valve
 - 2 do. brine do. do.
 - 2 do. CO₂ safety valve.
 - 1 pump for press. lubricator
 - 1 CO₂ pressure gauge.
 - 1 hydrometer
 - 2 brass cased thermometer
 - 12 safety discs
 - 1-1/8" CO₂ safety valve + 3 spare pipes for same.
 - 1 fitted box for compr. parts
- Fan Spares
- 1 complete motor.
 - 1 set bearings.
 - 1 set brush holders.
 - 1 set starter spares.

ARTICLES REQUIRED BY RULES AND NOT YET SUPPLIED

The foregoing is a correct description of the Refrigerating Machinery.

J. & E. HALL, LTD. Manufacturer.
 C. H. HALL, DIRECTOR

DESCRIPTION OF INSULATION.

	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. (Fore Peak)	A										
FRAME NO.	F										
FRAME NO.	A										
FRAME NO.	F										
FRAME NO.	A										
FRAME NO. (Boiler Room)	A										
FRAME NO. 72 (Engine Room)	A	✓	✓	gran. cork	11"	5/8" P.P.					
FRAME NO. 59	F	✓	✓	do	11"	do					
FRAME NO.	A										
FRAME NO.	F										
FRAME NO.	A										
FRAME NO.	F										
FRAME NO. (After Peak)	F										
SIDES		✓	✓	gran. cork	11"	5/8" P.P.					
OVERHEADING		✓	✓		10"						
FLOORS OF CHAMBERS		✓	✓		8"	- 1/2" P.P. ceiling					
TRUNK HATCHWAYS	✓										
THRUST RECESS, SIDES AND TOP							✓	✓	gran. cork	8"	5/8" P.P. 2" P.P. top
TUNNEL SIDES AND TOP									do	8"	do 2" P.P.
TUNNEL RECESS, FRONT AND TOP											
FRAMES OR REVERSE FRAMES, FACE											
BULKHEAD STIFFENERS, TOP	✓				BOTTOM	✓				AND FACE	✓
RIBBAND ON TOP OF DECKS	✓										
SIDE STRINGERS, TOP	✓				BOTTOM					AND FACE	
WEB FRAMES, SIDES	✓										
BRACKETS, TOP	✓				BOTTOM					AND FACE	
INSULATED HATCHES, MAIN			6" gran. cork	5/8" P.P.	BILGE			6" gran. cork		MANHOLE	✓
HATCHWAY COAMINGS, MAIN					BILGE						12" x 3" P.P.
HOLD PILLARS	✓										
MASTS	✓				VENTILATORS	✓					
Are insulated plugs fitted to provide easy access to bilge suction roses <u>yes</u> tank, air, and sounding pipes <u>✓</u> heels of pillars <u>✓</u>											
and manhole doors of tanks <u>yes</u> Are insulated plugs fitted to ventilators <u>✓</u> cargo parts <u>✓</u> sand side lights <u>✓</u>											
Is the insulation of the lower hold floor and tunnel top in way of the hatchways protected <u>yes</u> if so, how <u>2" pitch pine</u>											
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 <u>✓</u>											
Coal Bunker Bulkheads, and Brine Outflow and Return Pipes passing through coal bunkers. Is the insulation, so far as practicable, fireproof <u>✓</u>											
Where Cooling Pipes pass through watertight bulkheads or deck plating, are the fittings and packing of the stuffing boxes both watertight and fireproof <u>✓</u>											
Cargo Battens, Dimensions and spacing, sides <u>2 x 1 1/2</u> floors <u>2"</u> tunnel top <u>✓</u>											
fixed or portable <u>yes</u> Are screens fitted over the brine grids at chamber sides <u>✓</u> hinged or permanently fixed <u>✓</u>											
Thermometer Tubes, No. and position in each chamber <u>2, F 1 A.</u>											
diameter <u>2 1/4"</u> are they fitted in accordance with Section 3, Clause 8 <u>yes</u>											
Protection of Pipes. Are all pipes, including air and sounding pipes, which pass through or into insulated chambers, well insulated <u>yes</u>											
Draining Arrangements. Where the chambers are situated below the load water line, what provision is made for draining the inside of the chambers trapped sumps. <u>Where sluices, scupper pipes, and drain pipes are fitted are means provided for blanking them off</u> <u>✓</u>											
What provision is made for draining the refrigerating machinery room <u>✓</u>											
brine return room <u>✓</u> fan room <u>sumps P.S.</u> water circulating pump room <u>✓</u>											
Are all air spaces behind insulation arranged to drain to the bilges, bilge wells, or gutterways of the respective chambers. <u>✓</u>											

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Sounding Pipes, No. and position in each chamber situated below the load water line 1 each side P+S
 Diameter 1 1/2" 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 ✓
Air Trunkways in Chambers, inside dimensions, main 3.6 sq' and branch 1 sq' to 1.5 sq'
 Are they permanently fixed or collapsible, or portable Yes State position in chambers on roof & down bulkheads
 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 ✓ Are they galvanised externally ✓
 How are they arranged in the chambers ✓
Thawing Off, what provision is made for removing the snow from the cooling pipes in the chambers

The foregoing is a correct description of the Insulation and Appliances.

Gammell Laird & Co. Ltd Builders.
N. N. as bet.

Plans. Are approved Plans or Specifications forwarded herewith for the Refrigerating Machinery ✓ and Insulation Yes
 (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 machinery has been constructed under special survey and the materials and workmanship are good.

The insulation, trunkways & appliances have been built under special survey & the materials & workmanship are good. After being installed in the above vessel in an efficient manner, a cooling down test has been applied with satisfactory results, & the spare gear checked, & the installation is now eligible for record of + Lloyd's R.M.C. 11-33 for temperature of 25°F.

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.
<u>one</u>	<u>one</u>	<u>Carbauhy</u>	<u>G. & C. Hall Ltd</u>	<u>1933</u>	<u>Water circulation</u>	<u>534,000</u>	<u>9 1/2</u>	<u>2</u>	<u>24760</u>

Fee £ 6 : 0 : 0 (Lloyd's 20/100) (Lloyd's 20/100)
 Travelling Expenses £ : (Received by me, 27/1/34)
 Fee applied for, 19
 Received by me, 27/1/34

D. Gemmell
 Surveyor to Lloyd's Register.
P. Townsend.

Committee's Minute LIVERPOOL -1 DEC 1933

Assigned + Lloyd's R.M.C. 11-33
for temperature of 25°F.



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