

REPORT ON REFRIGERATING MACHINERY AND APPLIANCES.

(Received at London Office)

16 MAY 1929

Date of writing Report 3/5 1929 When handed in at Local Office

Port of Copenhagen

No. in

Reg. Book.

Survey held at Aarhus & Odense Date: First Survey 5/9 1928 Last Survey 27/4 1929

89097

(No. of Visits)

22

on the Refrigerating Machinery and Appliances of the M/s "ABRAHAM LINCOLN" Tons { Gross 5783.53 Net 3603.41

Vessel built at Odense By whom built Odense Haalskibsvaerft Yard No. 32 When built 1928-9

Owners M/s Bonheir (Fred. Olsen & Co.) Port belonging to Oslo. Voyage Oslo.

Refrigerating Machinery made by Thomas Th. Larsen & Co. Aarhus Machines No. 5640 When made 1928

Insulation fitted by Odense Haalskibsvaerft When fitted 1929 System of Refrigeration Carb. Nub.

Method of cooling Cargo Chambers Rim and Air. Insulating Material used granulated expanded cork

Number of Cargo Chambers insulated 3 Total refrigerated cargo capacity 74500 cubic feet.

DESCRIPTION OF REFRIGERATING MACHINERY. Where placed in the motor room.

Refrigerating Units, No. of 2 Single, double, or triple double Cubic feet of air delivered per hour TWEEN DE. AFT: 216,000 TWEEN DE. FOR: 487,000 LOWER HOLD: 1230,000

Total refrigeration or ice-melting capacity in tons per 24 hours 90 tons in temp. climate 55 tons in tropic - - Are all the units connected to all the refrigerated chambers yes.

Compressors, driven direct on through single reduction gearing. Compressors, single or double acting double acting No. of cylinders 2 x 2

Diameter of cylinders 73 mm. Diameter of piston rod 33 mm. Length of stroke 170 mm. No. of strokes per minute 270 - 180

Motive Power supplied from a direct coupled electric motor for each compressor.

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 equipped wound, enclosed ventilated, drip proof No. of 2 Rated 75 BHP. Kilowatts 220

Volts at 270 - 180 revolutions per minute. Diameter of motor shafts at bearings 80 mm.

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 266 cylindrical

No. of coils in each 2 coils of 6 sections Material of coils copper. Can each coil be readily shut off or disconnected yes.

Water Circulating Pumps, No. and size of 2 off centrifugal, 96 t. each, how worked electrically OIL Gas Separators, No. of 2

Gas Evaporators, No. of 1 Cast iron or steel casings steel plate, rectangular Pressure or gravity type gravity

No. of coils in each casing 2 coils of 4 sections Material of coils solid drawn iron tubes Can each coil be readily shut off or disconnected yes.

Direct Expansion or Brine Cooled Batteries, No. of 3 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 TWEEN DE. AFT: 2 TWEEN DE. FOR: 4 LOWER HOLD: 12 Material of coils solid drawn steel Can each coil be readily shut off or

disconnected yes. Total cooling surface of battery coils 7740 sq. ft. Is a watertight tray fitted under each battery yes.

Air Circulating Fans, Total No. of 2 TWEEN DE. AFT: 2 TWEEN DE. FOR: 4 LOWER HOLD: 12 216,000 - 487,000 cubic feet capacity, at 1000 - 500 550 - 450 600 - 300 revolutions per minute my fan of each size being intended for mixing flow of air.

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

Brine Circulating Pumps, No. and size of, including the additional pump 2 off centrifugal, 51 t. each, how worked electrically

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

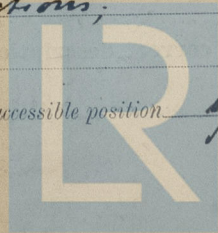
No. of brine sections in each BATTERY TWEEN DE. AFT: 2 sections; TWEEN DE. FORWD: 4 sections;

LOWER HOLD: 12 sections.

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

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

Im. 21, -1.



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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 *open tank*
Where the tanks are not closed is the compartment in which they are situated efficiently ventilated *No (in gases developed)*
Steam Condensing Plant. State what provision is made for condensing steam, in terms of Section 4, Clauses 13 and 14

HYDRAULIC AND OTHER TESTS.

DESCRIPTION.	Date of Test.	Working Pressure.	Hydraulic Test Pressure.	Air Test Pressure.	Stamped.	REMARKS.
ENGINE CYLINDERS (IF TESTED)						
GAS COMPRESSORS	5/9 28	64 atm	210 atm	105 atm		LLOYD'S TEST HYDR. PR. 210 ATM. AIR PR. 105 ATM. <i>OK 5-9-28</i>
OIL SEPARATORS	12/12 28	"	"	"		HYDR. PR. 210 ATM. AIR PR. 105 ATM. <i>OK 12-12-28</i>
CONDENSER COILS	10/10 12/12 28	"	"	"		
EVAPORATOR COILS	5/9 28	"	"	"		HYDR. PR. 210 ATM. AIR PR. 105 ATM. <i>OK 5-9-28</i>
CONDENSER HEADERS AND CONNECTIONS	5/9 28	"	"	"		
CONDENSER CASINGS	28/12 28	✓	15 lbs. per sq. in.	✓		LLOYD'S TEST 15/165. <i>OK 28-12-28</i>
EVAPORATOR CASINGS	✓	✓	✓	✓		
NH ₃ CONDENSER, EVAPORATOR AND AIR COOLER COILS AFTER ERECTION IN PLACE	✓	✓	✓	✓		
BRINE PIPING AFTER ERECTION IN PLACE	8/4 29	0.85 atm	✓	7 atm	✓	

Cooling Test. Has the refrigerating machinery been examined under full working conditions, and found satisfactory *yes*

Dates of test *24/4 25/4 29* Density of Brine *22 1/2°* by *Reaume'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 *✓* & *✓*
or, delivery and return air at *direct expansion* brine cooled batteries *✓*
TW. DK. A. - 7° - 7 1/2° C.
TW. DK. F. - 10 1/2° - 9° - 12 1/2° C. & - 11 1/2° C.
LOW. F. - 10 1/2° - 10°
atmosphere *mean* + 4° cooling water inlet and discharge *5 1/2° C. & 7° C.* gas in condensers *93 1/4° C.* and evaporators *- 31° C.*
TW. DK. A. - 9° C.
TW. DK. F. - 8 1/4°
the average temperature of the refrigerated chambers *✓* and the rise of temperature in these chambers upon the expiration of *12* hours
LOW. HOLD. - 9 1/2°
time after the machinery and cooling appliances have been shut off *✓*
TWEEN DK. AFT. 2 1/2°
TWEEN DK. FORWARD. 2 1/2°
LOWER HOLD. 2 1/2°

SPARE GEAR.

ARTICLES SUPPLIED AS <i>approx.</i>	ADDITIONAL SPARE GEAR SUPPLIED
1 compressor crank shaft.	1 size for seal box.
2 compressor pistons and piston rods.	1 CO ₂ pressure gauge.
3 set compressor piston rings.	1 CO ₂ charging valve & 3 charging pipes.
1 set connecting rod bottom end brasses with bolts.	1 Compressor.
1 set connecting rod top end bushes and crosshead pins.	1 thermometer, glass of each pattern used.
1 set main bearing brasses with bolts.	1 impeller & shaft for cooling water pumps.
4 compressor delivery valves with seats, guides & springs complete.	2 lengths of CO ₂ and brine tubes of each dimension used.
4 compressor suction valves with seats, guides & springs complete.	2 pairs of flange unions for each size of pipes.
1/2 dozen delivery valve springs.	1 set screw cutting tools for pipes.
1/2 dozen suction valve springs.	1 set of flange and fittings.
3 sets metallic packing rings for compressor piston rod.	1 valve spindle for each CO ₂ valve.
12 safety discs 140 atm.	1 set of bolts, studs & nuts.
12 " " 80 atm.	1 hammer for each size of nut.
6 sets fibre joint rings of each size.	1 set brush-holders for each size of motor.
1 CO ₂ gas regulating valve complete.	1 " carbon brushes " " " "
	1 " contact fingers for " " " "
	1 set of spare parts such as springs, screws, resistance coils etc for motor starters.

ARTICLES REQUIRED BY RULES AND NOT YET SUPPLIED *✓*

The foregoing is a correct description of the Refrigerating Machinery.

THOMAS THS. SABROE & CO. Manufacturer.

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. (Fore Peak)	A ✓									
FRAME No.	F ✓									
FRAME No.	A ✓									
FRAME No.	F ✓									
FRAME No.	A ✓									
FRAME No. 82	F ✓									
	A ✓	✓	Granulated cork	12 3/8	2 @ 5/8 paper between	✓	✓	Granulated cork	6 3/4	2 @ 5/8 paper between
FRAME No. 109 (Boiler Room) Motor	F ✓	✓	ditto	12 3/8	ditto	✓	✓	ditto	6 3/4	ditto
	A ✓									
FRAME No. (Engine Room)	A ✓									
	F ✓									
FRAME No.	A ✓									
	F ✓									
FRAME No.	A ✓									
	F ✓									
FRAME No.	A ✓									
	F ✓									
FRAME No. (After Peak)	F ✓									
SIDES ...	1-10 passage	✓	Granulated cork	12 3/8	2 @ 5/8 paper between	passage	✓	Granulated cork	10"	2 @ 5/8 paper between
OVERHEADING ...	✓	✓	ditto	9 1/4	2 @ 5/8 paper between	✓	✓	ditto	9 1/4	ditto.
FLOORS OF CHAMBERS ...	2"	1"	ditto	6"	4 x 2 4 @ 5/8	not insulated				
TRUNK HATCHWAYS ...	✓					✓	1 1/2"	Granulated cork	4	2 @ 5/8 paper between
THRUST RECESS, SIDES AND TOP ...	✓					✓	✓	✓	✓	✓
TUNNEL SIDES AND TOP ...	✓					✓	✓	✓	✓	✓
TUNNEL RECESS, FRONT AND TOP ...	✓					✓	✓	✓	✓	✓

FRAMES OR REVERSE FRAMES, FACE *3 1/2" x 6 x 2*

BULKHEAD STIFFENERS, TOP	BOTTOM	AND FACE
RIBBAND ON TOP OF DECKS	4 x 2 1/2" wavy frame with 4 x 1 1/2" with 2" space	
SIDE STRINGERS, TOP	BOTTOM	AND FACE
WEB FRAMES, SIDES	AND FACE	
BRACKETS, TOP	BOTTOM	AND FACE
INSULATED HATCHES, MAIN	6" L. L. & 5 1/2" insulating material	BILGE 4" cork
HATCHWAY COAMINGS, MAIN	1/2" plate	BILGE 4" cork
HOLD PILLARS	1/2" felt & canvas & 1 1/2" pine	
MASTS	VENTILATORS	
Are insulated plugs fitted to provide easy access to bilge suction roses <i>yes</i> tank, air, and sounding pipes <i>yes</i> heels of pillars <i>yes</i> .		
and manhole doors of tanks <i>yes</i> Are insulated plugs fitted to ventilators <i>yes</i> cargo ports, <i>yes</i> cargo ports and side lights <i>yes</i> side lights.		
Is the insulation of the lower hold floor and tunnel top in way of the hatchways protected <i>no</i> if so, how <i>✓</i>		

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 *✓*

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 *2" x 6" spaced 8"* floors *3 3/4" x 2 3/4" spaced 17"* tunnel top *✓*
fixed or portable *fixed* Are screens fitted over the brine grids at chamber sides *no* hinged or permanently fixed *✓*

Thermometer Tubes, No. and position in each chamber *LOWER HOLD: 4 off; TWEEN DK. AFT: 2 off; TWEEN DK. FORWARD: 3 off.*
diameter *2 1/2"* *BESES THESE 18 ELECTRIC DISTANCE THERMOMETERS ARE FITTED.* 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 *✓*
4 scupper pipes to bilges with liquid *✓* 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 *the refrigerating machinery is placed in the motor room*

brine return room *1 off 2 1/2" pipe to engine room* *1 off 2 1/2" pipe to engine room* *1 off 2 1/2" pipe to engine room*

Are all air spaces behind insulation arranged to drain to the bilges, bilge wells, or gutterways of the respective chambers. *✓*

Sounding Pipes, No. and position in each chamber situated below the load water line *4 off to cargo space (1 in each corner) 2 off aft to bilges*
Diameter *2 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 *yes*
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 *1-10"* and branch *1-10"*
Are they permanently fixed or collapsible, or portable *permanent* State position in chambers *along ship sides*
Where air trunkways pass through watertight bulkheads, are they fitted with watertight doors *yes* Are the door frames efficiently insulated *yes.*
Are insulated plugs supplied for the doorways *yes* Where are the doors worked from *engine room, upper deck level.*
AIR Cooling Pipes in Chambers, diameter *38/48 mm.* Are they galvanised externally *yes.*
How are they arranged in the chambers *in atwarships battens.*
Thawing Off, what provision is made for removing the snow from the cooling pipes in the chambers *low heating tank fitted.*

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

John Tillmann-Petersen Builders.

Plans. Are approved Plans or Specifications forwarded herewith for the Refrigerating Machinery *10/10 28* and Insulation *10/10 28.*
(Is not, state date of approval)
Is the Refrigerating Machinery and Appliances duplicate of a previous case *yes.* If so, state name of vessel *M/s Knute Nelson.*
If the survey is not complete, state what arrangements have been made for its completion and what remains to be done *complet.*

General Remarks (State quality of workmanship, opinions as to class, &c.)

The Refrigerating Machinery with appliances as above described has been constructed and fitted in accordance with the Society's Rules, the approved plans and letters E dated 11/10 & 12/11 28.

The material used for the construction has been tested and examined as required by the Rules and found good, and the workmanship is of good description throughout.

On completion the whole installation was tested under working conditions and found satisfactory.

Recommend the vessel to have notation of *LLOYDS RMC-4-29* in the Register Book.

It is submitted that
this vessel is eligible for
THE RECORD.

Lloyds RMC 4-29

R.A. 16/5/29

PARTICULARS TO BE ENTERED IN REGISTER BOOK.

REFRIGERATING MACHINES.					System of (1) Refrigerating (2) Insulating the Chambers.	POWER.		INSULATED CARGO CHAMBERS.	
No. and whether Single or Duplex.	Makers.	Date of Construction.	System.	Type.		Cubic feet of air delivered per hour.	Ice melting capacity per 24 hours. Tons.	No.	Capacity.
2 M & N Thomas The. Fabree duplex & co. Aarhus		1928	Carl Auby Fabree	Brine & Air 2 Green Label cork	1.933.000	73	3	74.500	

Fee *Nr. 550.00* { Fee applied for, *13.5 19 29*

Travelling Expenses *119.00* { Received by me, *25.5 19 29*

Date for: *30.00*

Committee's Minute *FRL 17 MAY 1929*

Assigned

Lloyds RMC 4-29

A. H. Hiff. & J. B. Buchanan.
Surveyors to Lloyd's Register.



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