

REPORT ON REFRIGERATING MACHINERY AND APPLIANCES.

(Received at London Office)

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Date of writing Report 18/12 1930 When handed in at Local Office Port of Copenhagen
 No. in Reg. Book. 90961 Survey held at Nakskov Date: First Survey 2/7 1930 Last Survey 17/12 1930
 (No. of Visits) 27

on the Refrigerating Machinery and Appliances of the Stein Finner S. "INDIA" Tons { Gross 9549.15
 Net 6030.63

Vessel built at Nakskov By whom built Nakskov Skibsværft Yard No. 39 When built 1930
 Owners D. A. Asiatiske Kompagni Port belonging to Copenhagen Voyage Pacific coast.
 Refrigerating Machinery made by Thomsen & Søn, Copenhagen Machines No. 6787-8 When made 1930
 Insulation fitted by Nakskov Skibsværft When fitted 1930 System of Refrigeration Carb. Anhyd.
 Method of cooling Cargo Chambers Brine & Air Insulating Material used Granulated Cork
 Number of Cargo Chambers insulated 2 Total refrigerated cargo capacity 20900 cubic feet.

DESCRIPTION OF REFRIGERATING MACHINERY.

Refrigerating Units, No. of 2 Single, double, or triple single Where placed Compressor & condensers with cooling water pumps placed in the engine room. Evaporators and brine pumps in an insulated chamber under main deck, inside engine room.
 Cubic feet of air delivered per hour 780.000
 Total refrigeration or ice-melting capacity in tons per 24 hours 17.4 Are all the units connected to all the refrigerated chambers yes.

Compressors, driven direct or through single reduction gearing Compressors, single or double acting double acting No. of cylinders 1

Diameter of cylinders 65 7/8 in. Diameter of piston rod 30 mm. Length of stroke 150 mm. No. of strokes per minute 380

Motive Power supplied from 1 shunt wound D.C. electromotor for each compressor.

Steam Engines, high pressure, compound, or triple expansion, surface condensing. No. of cylinders 2 Diameter 18 in.

Length of stroke 24 in. Working pressure 150 lb. Diameter of crank shaft journals and pins 3 in.

Breadth and thickness of crank webs 1 1/2 in. x 1 1/2 in. No. of sections in crank shaft 1 Revolutions of engines per minute 380

Oil Engines, type 2 or 4 stroke cycle Single or double acting single acting B.H.P. 220

No. of cylinders 2 Diameter 18 in. Length of stroke 24 in. Spare of bearings as per Rule 1

Maximum pressure in cylinders 150 lb. Diameter of crank shaft journals and pins 3 in.

Breadth and thickness of crank webs 1 1/2 in. x 1 1/2 in. No. of sections in crank shaft 1 Revolutions of engine per minute 380

Electric Motors, type shunt wound, dip proof No. of 2 Rated 33 BHP Kilowatts 220

Volts at 380 revolutions per minute 380 Diameter of motor shafts at bearings 75 mm.

Reduction Gearing, maximum shaft horse power at 1st pinion 220 Revolutions per minute at full power at 1st pinion 380

2nd pinion 18 in. 1st reduction wheel 36 in. main shaft 3 in. Pitch circle diameter, 1st pinion 36 in. 2nd pinion 18 in.

1st reduction wheel 36 in. Main wheel 36 in. Width of face, 1st reduction wheel 3 in. Main wheel 3 in.

Distance between centres of pinion and wheel faces and the centre of the adjacent bearings, 1st pinion 36 in. 2nd pinion 18 in.

1st reduction wheel 36 in. Main wheel 36 in. Flexible pinion shafts, diameter 1st 3 in. 2nd 3 in.

Pinion shafts, diameter at bearings, External, 1st 3 in. 2nd 3 in. Internal, 1st 3 in. 2nd 3 in.

Diameter at bottom of teeth of pinion, 1st 3 in. 2nd 3 in. Wheel shafts, diameter at bearings, 1st 3 in.

Main 3 in. Diameter at wheel shroud, 1st 3 in. Main 3 in.

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

No. of coils in each 1 divided in 3 sections Material of coils copper, 18/24 7/8 dia. Can each coil be readily shut off or disconnected No.

Water Circulating Pumps, No. and size of 1 of 48 g.p.h., 2 of 300 g.p.h. how worked electrically Gas Separators, No. of 2

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

No. of coils in each casing 1 divided in 3 sections Material of coils steel, 25/33 7/8 dia. Can each coil be readily shut off or disconnected yes.

Direct Expansion or Brine Cooled Batteries, No. of 2 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 2 Material of coils steel Can each coil be readily shut off or

disconnected yes Total cooling surface of battery coils 2000 sq. ft. Is a watertight tray fitted under each battery yes

Air Circulating Fans, Total No. of 2 each of 390.000 cubic feet capacity, at 2000 revolutions per minute variable

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 of 24 g.p.h. 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 chamber 4 1 Forward shaft bulkheads, 2 Ship's side, 3 C.I. bulkhead, 4 Under deck.

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

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

Im. 1223-T.

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 tanks*
Where the tanks are not closed is the compartment in which they are situated efficiently ventilated *ventilated through access door. No gas 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)	<i>✓</i>					
GAS COMPRESSORS	<i>2/7 30</i>	<i>ca. 50 kg/cm²</i>	<i>2/6 kg/cm²</i>	<i>105 kg/cm²</i>	<i>LLOYD'S TEST</i>	<i>HYDR. PR. 2/10 ATM. <i>✓</i> 2.7.30</i>
" SEPARATORS	<i>2/7 30</i>	"	"	"	<i>✓</i>	<i>HYDR. PR. 2/10 ATM. <i>✓</i> 2.7.30</i>
" CONDENSER COILS	<i>2/7 30</i>	"	"	"	<i>✓</i>	<i>HYDR. PR. 2/10 ATM. <i>✓</i> 2.7.30</i>
" EVAPORATOR COILS	<i>5/8 30</i>	"	"	"	<i>✓</i>	<i>H. P. 2/10 ATM. <i>✓</i> 2.7.30</i>
" CONDENSER HEADERS AND CONNECTIONS	<i>2/7 30</i>	"	"	"	<i>✓</i>	<i>HYDR. PR. 2/10 ATM. <i>✓</i> 2.7.30</i>
" CONDENSER CASINGS	<i>5/8 30</i>	<i>ca. 0.5</i>	<i>15 lb./sq. in.</i>	<i>✓</i>	<i>✓</i>	<i>LLOYD'S TEST 15 lb. <i>✓</i> 2.7.30</i>
" EVAPORATOR CASINGS	<i>✓</i>					
NH ₃ CONDENSER, EVAPORATOR AND AIR COOLER COILS AFTER ERECTION IN PLACE	<i>✓</i>					
BRINE PIPING AFTER ERECTION IN PLACE	<i>25/11 25/11</i>	<i>ca. 1.5</i>	<i>✓</i>	<i>90 lbs./sq. in.</i>	<i>✓</i>	

Cooling Test. Has the refrigerating machinery been examined under full working conditions, and found satisfactory *yes*.
Dates of test *13/12 - 14/12 30*. Density of Brine *29°* by *Reaumur'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 or brine cooled batteries *✓* & *✓*, outflow and return brine *-27° C.* & *-25.5° C.*
atmosphere *+2° C.* cooling water inlet and discharge *+4° C.* & *+7° C.* gas in condensers *+11° C.* and evaporators *+30° C.*
the average temperature of the refrigerated chambers *-19° C.* 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 *4° C.*

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 *✓*

ADDITIONAL SPARE GEAR SUPPLIED.

2 compressors pistons with rods & rings complete. 2 sets of metallic packing rings for piston rod. 1 set piston rings. 2 compressors suction & delivery valves complete. 3 springs for do. 12 safety discs 140 atm. 12 do. 80 atm. 3 thermometers for brine, 2 do. for cooling water, 12 open scales for each type of these thermometers.
2 open scales for thermometers on CO₂ delivery pipe. 6 chamber thermometers. 6 fibre joint rings of each size used. fibre jointing material and tools for cutting packings. 1 delivery and return valve for brine header. 1 piece for scale top, 1 connecting rod top and bush & crosshead pin. 1 pair of cranks pin bases, 2 main bearing bases with shafts, 1 complete set of spanners & special tools.
1 CO₂ charging pipe, 2 flanges with bolts for each size of CO₂ pipes. 1 armature, 1 brine pressure gauge, 2 brine level gauges for evaporator, 1 spindle for each CO₂ stop valve, 1 spindle for CO₂ regulator stop valve, 1 set gear wheel with shafts for lubricating oil pump, 1 lubricator for compressor, 1 set screw cutting tools for pipes 1/2"-1 1/2". 1 pipe grips, 1 portable tachometer, 1 impeller with shaft complete for brine pumps, 1 impeller with shaft complete for cooling water pump. 1 electromotor complete for the air circulating fan, 1 propeller for do., 1 set of controls upon parts for do., 1 armature with shaft for each type of electromotor used, 1 set of carbon brushes for each motor and 1/2 set of brush holders for each motor.
3 induction coils of each size for the electromotors for the compressor motors, 6 contact fingers and 1 magnetic coil for do. Tension pipes, flanges, bolts &c.
2 CO₂ gauges.

ARTICLES REQUIRED BY RULES AND NOT YET SUPPLIED *✓*

The foregoing is a correct description of the Refrigerating Machinery.

AKTIEGELSKABET
THOMAS THS. SABROE & CO.
K. Thomsen *O. Kramhøft*
Manufacturer.

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)	<i>✓</i>									
FRAME No.	<i>✓</i>									
FRAME No. 129	<i>✓</i>					<i>✓</i>	<i>6 x 1 1/2 T+G</i>	<i>Gran. Cork.</i>	<i>10"</i>	<i>✓</i>
FRAME No. 105	<i>✓</i>					<i>✓</i>	<i>6 x 1 1/2 T+G</i>	<i>Gran. Cork.</i>	<i>10"</i>	<i>✓</i>
FRAME No. (Boiler Room)	<i>✓</i>									
FRAME No. (Engine Room)	<i>✓</i>									
FRAME No.	<i>✓</i>									
FRAME No.	<i>✓</i>									
FRAME No.	<i>✓</i>									
FRAME No.	<i>✓</i>									
FRAME No. (After Peak)	<i>✓</i>					<i>✓</i>	<i>6 x 1 1/2 T+G</i>	<i>Gran. Cork.</i>	<i>10"</i>	<i>✓</i>
SIDES	<i>✓</i>					<i>✓</i>	<i>6 x 1 T+G</i>	<i>Gran. Cork.</i>	<i>12"</i>	<i>6 x 3/8 T+G</i>
OVERHEADING	<i>✓</i>					<i>✓</i>	<i>6 x 1 T+G</i>	<i>Cork Slabs</i>	<i>2 @ 4" thick</i>	<i>✓</i>
FLOORS OF CHAMBERS	<i>✓</i>					<i>✓</i>	<i>6 x 1 1/2 T+G</i>	<i>Gran. Cork.</i>	<i>10"</i>	<i>✓</i>
TRUNK HATCHWAYS	<i>✓</i>					<i>✓</i>	<i>6 x 1 1/2 T+G</i>	<i>Gran. Cork.</i>	<i>10"</i>	<i>✓</i>
THRUST RECESS, SIDES AND TOP	<i>✓</i>					<i>✓</i>				
TUNNEL SIDES AND TOP	<i>✓</i>					<i>✓</i>				
TUNNEL RECESS, FRONT AND TOP	<i>✓</i>					<i>✓</i>				

FRAMES OR REVERSE FRAMES, FACE *8 x 2" Pine* *1" *✓**

BULKHEAD STIFFENERS, TOP *✓* BOTTOM *✓* AND FACE *✓*

RIBBAND ON TOP OF DECKS *2 x 2 1/2" pine, spaced 30" Cr. with 3 x 1 1/2" battens on top.*

SIDE STRINGERS, TOP *✓* BOTTOM *✓* AND FACE *✓*

WEB FRAMES, SIDES *✓* AND FACE *✓*

BRACKETS, TOP *✓* BOTTOM *✓* AND FACE *✓*

INSULATED HATCHES, MAIN *✓* BILGE *✓* MANHOLE *✓*

HATCHWAY COAMINGS, MAIN *✓* BILGE *✓*

HEAD PILLARS *5" Gran. Cork*

MASTS *✓* VENTILATORS *8" cork*

Are insulated plugs fitted to provide easy access to bilge suction roses *✓* tank, air, and sounding pipes *✓* heels of pillars *✓*

and manhole doors of tanks *✓* 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 *✓* if so, how *✓*

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 *4 1/2" x 2" spaced 15" c.c. floors 3 1/2" spaced 4" c.c. tunnel top* *✓*

fixed or portable *portable* Are screens fitted over the brine grids at chamber sides, *also walls* *hinged or permanently fixed* *portable*

Thermometer Tubes, No. and position in each chamber *3 off, 1 in forced end, 1 at corner of bulk hatchway, 1 in after end.*

diameter *3"* 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 *above* the load water line, what provision is made for draining the inside of the chambers *4 off 2" scupper pipes, led down 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 *main engine room.*

brine return room *scupper pipe led to engine room bilge* *water circulating pump room* *main engine room.*

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

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Sounding Pipes, No. and position in each chamber situated below the load water line

Diameter ☒ 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 *8" wide.*

and branch ☒

Are they permanently fixed or collapsible, or portable *portable.*

State position in chambers *along all sides of chambers*

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 *38/48 in.*

Are they galvanised externally *no, painted; lead & return pipes* ☒

How are they arranged in the chambers *in flat coils, 5 at ship's side, 3 on centre bld., 3 on trunk hatchway, 2 on forward bld. and 6 under deck.*

Thawing Off, what provision is made for removing the snow from the cooling pipes in the chambers *brine heat, fitted taking steam from working coils, warm brine can be circulated thro' any part of system by one brine pump while the other brine pump is circulating cold brine thro' the remaining sections.*
The foregoing is a correct description of the Insulation and Appliances.

**AKTIESELSKABET
NAKSKOV SKIBSVÆRFT**

O. Nielsen. Builders.

Plans. Are approved Plans or Specifications forwarded herewith for the Refrigerating Machinery ☒ *yes.* 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, etc.)

The Refrigerating machinery with appliances and insulation as above described has been constructed, fitted and tested under special survey and in accordance with the Society's Rules, the approved plans and the requirements contained in the Surveyor's Letter E dated 31/5. 13/6. 18/6. 24/6. 1/7. 7/7. 15/7. 16/7. 20/8 1930.

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

On completion of the installation on board the vessel the refrigerating machinery was tested under working conditions and found satisfactory, and the efficiency of the insulation was tested as per Rules and found good.

Recommend the vessel to have notation of **+LLOYD'S RMC-12-30** REF. M.C.H.Y. in the Register Book.

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	CARB. AN. HYDRIDE	THOMAS THS. JABROE & CO. LTD. AARHUS	1930	BRINE & AIR GRANULATED CORK	780,000	17.4	2	20,900

Fee *14.* 500.00 { Fee applied for, *2.1* 1931/12/30
Travelling Expenses & *135.00* { Received by me, *16/2/31*
SUNDAY FEE *50.00*

Committee's Minute

FRI. 9 JAN 1931

Assigned

+Lloyd's Rmc. 12.30.

CERTIFICATE WRITTEN.

**LLOYD'S REGISTER
FOUNDATION**