

Rpt. 17 (a)

Date of writing Report 15th June, 1960 Received London Osaka Port Kobe No. of visits 8 First date 12th Dec., 1959 Last date 22nd February, 1960
Survey held at Osaka

REFRIGERATED CARGO INSTALLATION
REPORT ON REFRIGERATING MACHINERY

Machinery made by Sabroe Co., of Japan Ltd. Machine Nos. 330112, 330113 & 330114 When made Feb., 1960
Intended for Yard No. or Ship's Name Ship No. 1532
Built or building at Nagasaki, Japan By whom Mitsubishi Shipbuilding & Eng. Co., Ltd.,
Nagasaki Works,
OWNERS Daido Kaiun K.K.
Primary refrigerant Dichlorodifluoromethane Medium for cooling chambers (brine, primary refrigerant, etc.) Cold air circulation

PARTICULARS OF REFRIGERATING MACHINES OF EACH SIZE (Including machines (if any) for cooling liquid refrigerant)

RECIPROCATING TYPES

(1) No. of machines	No. of cylinders per machine	Single or double acting	Single or two-stage
<u>3</u>	<u>3 (2LP & 1HP)</u>	<u>Single</u>	<u>Two</u>
Diameter of cylinders <u>150mm</u>	Vertical, horizontal or Vee <u>Vertical</u>	Diameter of piston rod if double acting <u>250</u>	
No. of cranks <u>3</u>	Stroke <u>125 mm</u>	Speed of machines as fitted: Maximum R.P.M. <u>500</u>	Minimum R.P.M. <u>250</u>
Single speed, set speeds or variable speed <u>Set speeds</u>		Clearance volume as percentage of swept volume <u>3.7</u>	<u>V belt</u>
Swept volume of machine(s) at maximum R.P.M. <u>2.21 cubic M. per minute</u>		How driven (direct, V belt, gearing, etc.) <u>B.H.P. 22 KW</u>	Maximum R.P.M. <u>1800</u>
Prime Movers (steam engine, oil engine, electric motor, etc.) <u>Electric motor</u>			

(2) No. of machines	No. of cylinders per machine	Single or double acting	Single or two-stage
<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>
Diameter of cylinders <u>-</u>	Vertical, horizontal or Vee <u>-</u>	Diameter of piston rod if double acting <u>-</u>	
No. of cranks <u>-</u>	Stroke <u>-</u>	Speed of machines as fitted: Maximum R.P.M. <u>-</u>	Minimum R.P.M. <u>-</u>
Single speed, set speeds or variable speed <u>-</u>		Clearance volume as percentage of swept volume <u>-</u>	
Swept volume of machine(s) at maximum R.P.M. <u>-</u>		How driven (direct, V belt, gearing, etc.) <u>-</u>	Maximum R.P.M. <u>-</u>
Prime Movers (steam engine, oil engine, electric motor, etc.) <u>-</u>		B.H.P. <u>-</u>	

Material of compressor crankshafts Steel forging Have they been manufactured and tested in accordance with the Rules and/or Secretary's letters? Yes
Tensile strength 57.1, 57.5 & 57.5 kg/mm² Have other important steel forgings and castings been manufactured and tested in accordance with the Rules? Yes
Are safety devices fitted to compressors in accordance with the Rules? Yes Are compressors arranged for multiple-effect compression? No

OTHER TYPES (e.g., Centrifugal, steam jet, etc.)

(3) -

Where two machines only are provided, are all the working parts interchangeable? -
Is provision to be made for liquid refrigerant sub-cooling? Yes If so, state method. Liquid discharges cooled by gas flow in interstage cooler, temperature of which controlled by expansion valve in liquid branch line.

PARTICULARS OF GAS CONDENSERS OF EACH TYPE AND SIZE

No. of shell-and-tube type	No. of shells in each	No. of tubes per shell	Material and thickness of tubes
<u>3</u>	<u>1</u>	<u>158</u>	<u>Alumi Brass 1,24 mm</u>
Cooling medium and No. of passes <u>sea water 4 passes</u>			No. of tubes each pass <u>39/40</u>
Total No. of tubes per condenser <u>158</u>			Internal diameter of tubes <u>13.4 mm</u>
No. of coil-in-casing type <u>-</u>	No. of casings <u>-</u>	No. of coils each casing <u>-</u>	Total external surface of tubes in each condenser <u>15.3 sq. M.</u>
External surface of each coil <u>-</u>			Material, external diameter and thickness of coils <u>-</u>
Total external surface of coils each condenser <u>-</u>			Cooling medium and No. of passes <u>-</u>
Other types <u>-</u>			Can each coil be readily shut off or disconnected? <u>-</u>

PARTICULARS OF EVAPORATORS (BRINE COOLERS) OF EACH TYPE AND SIZE.

No. of shell-and-tube type	No. of shells in each	No. of tubes per shell	Material and thickness of tubes
<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>
No. of passes of brine <u>-</u>			Internal diameter of tubes <u>-</u>
Total No. of tubes per evaporator <u>-</u>			Total external surface of tubes in each evaporator <u>-</u>
No. of coil-in-casing type <u>-</u>	No. of casings <u>-</u>	No. of coils each casing <u>-</u>	Material, external diameter and thickness of coils <u>-</u>
External surface of each coil <u>-</u>			Can each coil be readily shut off or disconnected? <u>-</u>
Total external surface of coils each evaporator <u>-</u>			
Other types <u>-</u>			

OTHER COMPONENTS, ETC.

No. of oil separators	No. of strainers	No. of liquid receivers	No. of driers	No. of brine heaters
<u>6</u>	<u>7</u>	<u>3</u>	<u>3</u>	<u>-</u>
Other pressure vessels, give particulars <u>3 interstage coolers</u>				
Particulars of air cooler coils <u>34 mm</u>	Plain coils, external diameter <u>34 mm</u>	Thickness <u>3.2 mm</u>	Material <u>Seamless stud pipe</u>	
Extended surface coils, internal diameter <u>-</u>			Material <u>-</u>	
Pitch of fins or plates <u>-</u>	Dimensions of fins or plates <u>351.5 M.</u>	Total extended surface per foot of pipe <u>-</u>		
Air cooler coil assemblies, total No. <u>8</u>	Length of pipe and No. of coils of each size <u>6 coils per air cooler</u>	Can each coil be readily shut off or disconnected? <u>No</u>		
Cooling grid sections, total No. and length of pipe of each size <u>-</u>				

Primary refrigerant piping, internal diameter and thickness of each size -
Material -

How manufactured -

Have all components of the refrigerating plant been constructed strictly in accordance with the Rules and approved plans? Yes
Has the spare gear required by the Rules been supplied? Yes Where additional spare gear has been supplied a list is to be attached to the Report.
The foregoing is a correct description of the refrigerating machinery.

PRESSURE TESTS AT WORKS

DESCRIPTION	Working Pressure	Hydraulic Pressure	Date of Test	Air Test Pressure	Date of Test	Stamped
Compressor cylinders	10.5 kg/cm ²	24.5 kg/cm ²	8-2-60	14 kg/cm ²	8-2-60	JN
Compressor crankcases	7 "	14 "	8-2-60	10.5 "	8-2-60	JN
Oil separators, direct	10.5 kg/cm ²	24.5 "	13-2-60	14 "	15-2-60	MH & JN
Filters	10.5 ") Not tested at Makers' Works				
Driers	10.5 ")				
Strainers	10.5 "	24.5 kg/cm ²	8-2-60	14 kg/cm ²	8-2-60	JN
Stop valves and connections	10.5 "	24.5 "	13-2-60	14 "	15-2-60	MH & JN
Liquid receivers	10.5 "	24.5 kg/cm ²	13-2-60	14 "	15-2-60	MH & JN
Condenser shells & tubes	-	-	-	-	-	
Evaporator (brine cooler) shells or coils	-	-	-	-	-	
Condenser headers and connections	-	-	-	-	-	
Condenser water water ends	16 M. head	7 kg/cm ²	13-2-60	-	-	MH
Evaporator headers and connections	-	-	-	-	-	
Evaporator coil casings or brine ends	10.5 kg/cm ²	24.5 kg/cm ²	20-2-60	14 kg/cm ²	20-2-60	JN
Air cooler coil assemblies	-	-	-	-	-	
Chamber grid sections	-	-	-	-	-	
Float regulators	-	-	-	-	-	
Brine heaters	-	-	-	-	-	
Primary refrigerant piping	10.5 kg/cm ²	24.5 kg/cm ²	13-2-60	14 kg/cm ²	15-2-60	MH & JN
Other pressure parts	Interstage Coolers					

PLANS: Drawing No. and date of approval of each plan concerned.

Approved 26-2-60 London for general approval.

Compressors, crankshaft.	8C
Filters	6103B
Evaporators	-
Condensers	8996-2
Air coolers	13568
Other pressure parts	Interstage coolers

Crankcases	3C
Separators	7771A
Strainers	10748, 6891
Driers	6103B

Cylinders	5A
Liquid receivers	8996-2
Float regulators	-
Brine heaters	-

General remarks (state quality of workmanship, opinions as to class, etc.)

The refrigerating machinery has been constructed under special survey in accordance with the requirements of the Rules, approved plans and Secretary's letters.

The materials and workmanship are good.

It is recommended that this refrigerating machinery is eligible for the class notation of **LLOYD'S RMC** with temperature notations when satisfactorily installed on board the ship in accordance with the requirements of the Society's Rules.

PARTICULARS OF MACHINERY FOR REGISTER BOOK

No. of units 3
 Total B.H.P. of all compressor prime movers 88.4 (66 KW)
 Makers Sabroe Co., of Japan Ltd.

Prime Movers Electric motor
 Refrigerant Dichlorodifluoromethane
 Date of construction 1960

MACHINERY PARTICULARS:

3 - 3 cyl. SA Con. Compressors 150 & 150 x 125mm x 500 r.p.m.
3 - S & T Condensers.

SURVEY FEE (Based on measured cubic capacity on completion of installation.)

Construction £ 51.100.-
 Travelling expenses £ 3.000.-

Fee applied for, JUL - 2 1960

Received by me, _____

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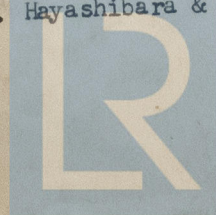
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M. Hayashibara & J. Nonomura
 Surveyor to Lloyd's Register

M. Hayashibara & J. Nonomura

Date of Committee _____

Minute _____



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