

Rpt. 17 (a)

Date of writing Report 15th June, 1960 Received London Osaka No. of visits 8 Port Kobe First date 12th Dec., 1959 Last date 22nd February, 1960  
 Survey held at Osaka Machine Nos. 330112, 330113 & 330114 When made Feb., 1960

## 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. Medium for cooling chambers (brine, primary refrigerant, etc.) Cold air circulation  
 Primary refrigerant Dichlorodifluoromethane

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

RECIPROCATING TYPES

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

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/mm<sup>2</sup> 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	3	No. of shells in each	1	No. of tubes per shell	158	Material and thickness of tubes	Alumi Brass 1,24 mm
Cooling medium and No. of passes	Sea water	No. of passes	4	No. of tubes each pass	39/40	Internal diameter of tubes	13.4 mm
Total No. of tubes per condenser	158	Total external surface of tubes in each condenser	15.3 sq. M.				
No. of coil-in-casing type	-	No. of casings	-	No. of coils each casing	-	Material, external diameter and thickness of coils	-
External surface of each coil	-	Total external surface of coils in each condenser	-	Cooling medium and No. of passes	-	Can each coil be readily shut off or disconnected?	-
Other types	-						

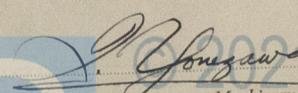
### PARTICULARS OF EVAPORATORS (BRINE COOLERS) OF EACH TYPE AND SIZE.

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

OTHER COMPONENTS, ETC.

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

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.

  
 Machinery Manufacturers.  
 Sabroe Co., of Japan Ltd., Osaka.  
 Lloyd's Register Foundation  
 012036-012041-0048

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 <sup>2</sup>	24.5 kg/cm <sup>2</sup>	8-2-60	14 kg/cm <sup>2</sup>	8-2-60	JN
Compressor crankcases	7 "	14 "	8-2-60	10.5 "	8-2-60	JN
Oil separators, <del>filters</del>	10.5 kg/cm <sup>2</sup>	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 <sup>2</sup>	8-2-60	14 kg/cm <sup>2</sup>	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 <sup>2</sup>	13-2-60	14 "	15-2-60	MH & JN
Condenser shells & tubes	-	-	-	-	-	-
Evaporator (brine cooler) shells or coils	-	-	-	-	-	-
Condenser <del>shells</del> of water ends	16 M. head	7 kg/cm <sup>2</sup>	13-2-60	-	-	MH
Evaporator headers and connections	-	-	-	-	-	-
Evaporator coil casings or brine ends	10.5 kg/cm <sup>2</sup>	24.5 kg/cm <sup>2</sup>	20-2-60	14 kg/cm <sup>2</sup>	20-2-60	JN
Air cooler coil assemblies	-	-	-	-	-	-
Chamber grid sections	-	-	-	-	-	-
Float regulators	-	-	-	-	-	-
Brine heaters	-	-	-	-	-	-
Primary refrigerant piping	10.5 kg/cm <sup>2</sup>	24.5 kg/cm <sup>2</sup>	13-2-60	14 kg/cm <sup>2</sup>	15-2-60	MH & JN
Other pressure parts Interstage Coolers	10.5 kg/cm <sup>2</sup>	24.5 kg/cm <sup>2</sup>	13-2-60	14 kg/cm <sup>2</sup>	15-2-60	MH & JN

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

Approved 26-2-60 London for general approval.

Compressors, crankshaft	8C	Crankcases	3C	Cylinders	5A
Filters	6103B	Separators	7771A	Liquid receivers	8996-2
Evaporators	-	Strainers	10748, 6891	Float regulators	-
Condensers	8996-2	Driers	6103B	Brine heaters	-
Air coolers	13568				
Other pressure parts	Interstage coolers 9097A				

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		Prime Movers	Electric motor
No. of units	3	Refrigerant	Dichlorodifluoromethane
Total B.H.P. of all compressor prime movers	88.4 (66 KW)	Date of construction	1960
Makers	Sabroe Co., of Japan Ltd.		
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, [Signature]

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

Date of Committee  
 Minute