

Rpt. 17 (b)

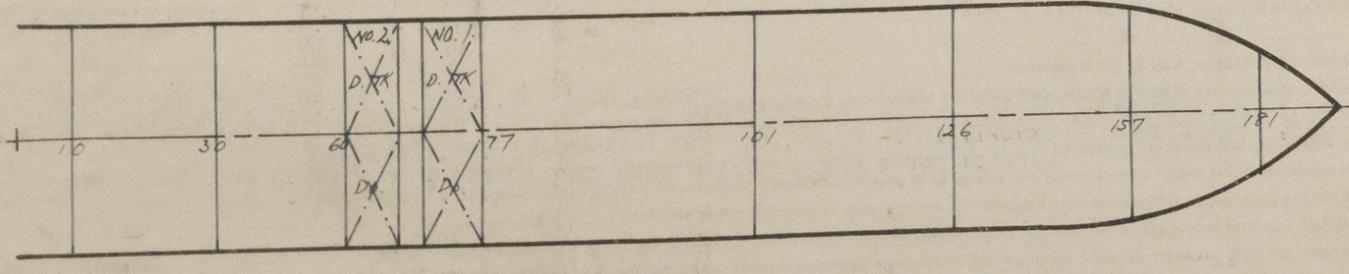
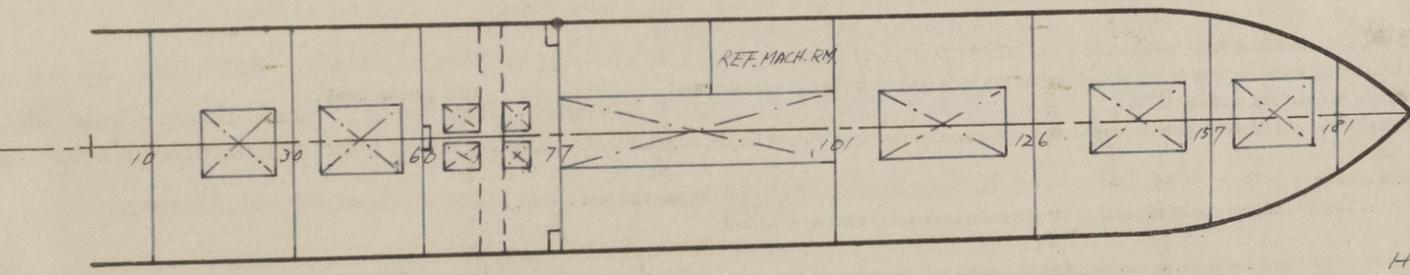
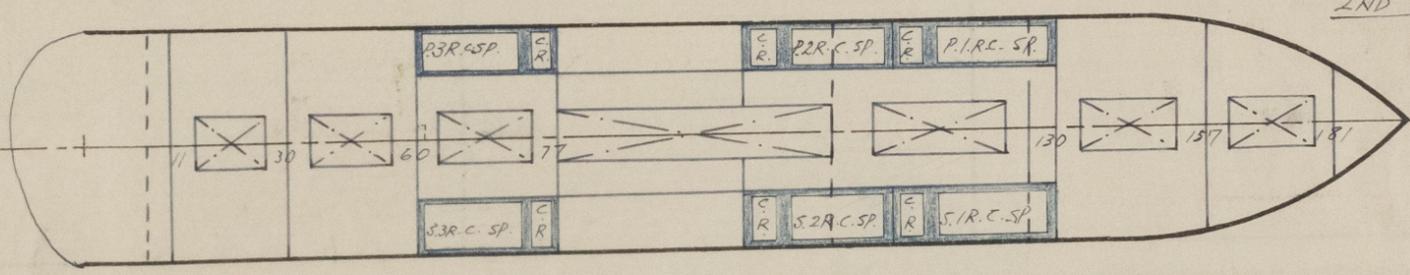
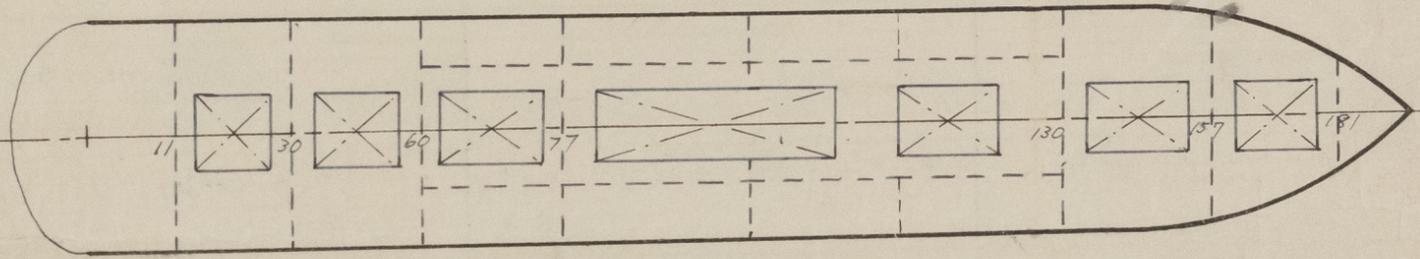
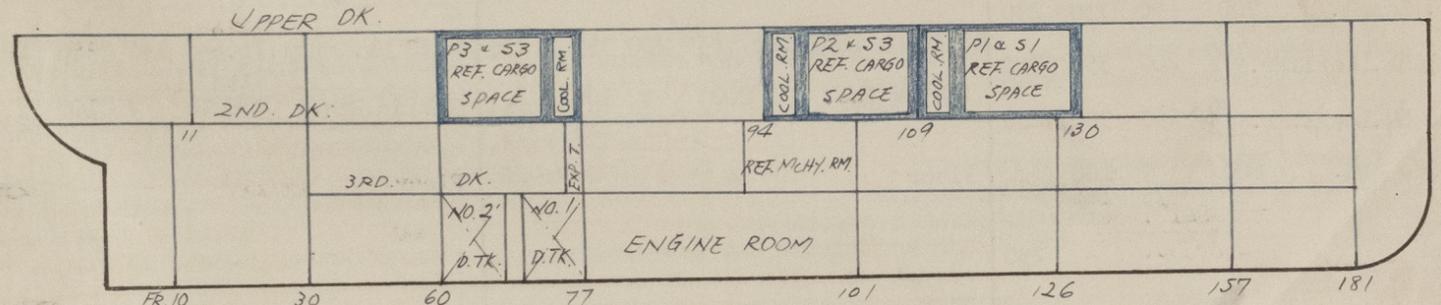
-3 OCT 1958

Date of writing Report Received London Port KOBE No. FE-5921  
Survey held at Tamano, Japan No. of visits 53 First date 4th Feb., 1958 Last date 15th July, 1958

### REFRIGERATED CARGO INSTALLATION—REPORT ON INSULATION WORK, ERECTION OF PLANT ON BOARD AND TESTS AFTER COMPLETION

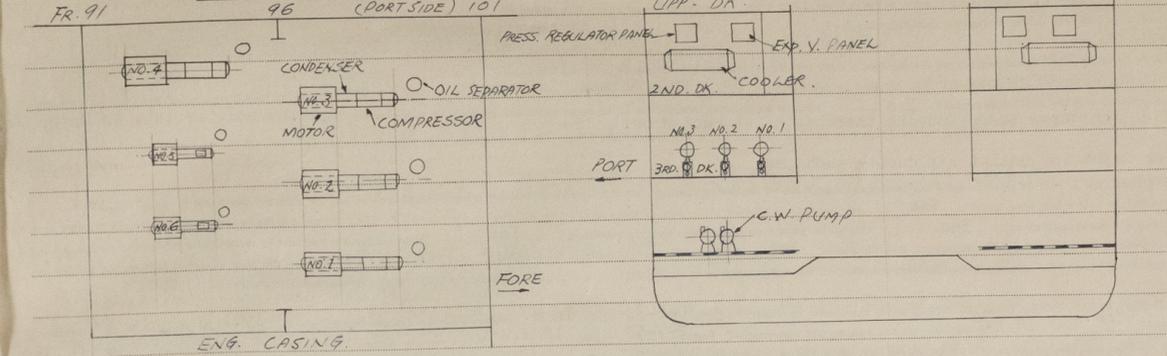
No. in R.B. Name "MEGUROSAN MARU"  
Built at Tamano, Japan By whom Mitsui Shipbuilding & Eng. Co., Ltd., Tamano Works Gross tons 9,565.69  
Owners Mitsui Sempaku K. K. Port of Registry Tokyo Yard No. 630  
Refrigerating Machinery made by Mitsui S.B. & Eng. Co., Ltd. Machine Nos. 51, 52, 53, 54, 56, 57 When made May, 1958  
Insulation fitted by Mitsui S.B. & Eng. Co., Ltd., Tamano Works Total No. of Chambers 6  
Total refrigerated cargo capacity measured in accordance with Society's requirements 22,327 cu. ft.

Location and boundaries in elevation and plan of each refrigerated cargo chamber, main and refrigerating machinery space(s), evaporator and brine rooms, and cooler houses to be shown by inserting decks and bulkheads in the diagrams. The frame numbers to be shown at each transverse bulkhead. The decks to be clearly marked in elevation and plan. Insulation to be shown by a line (preferably in colour) on the appropriate side or sides of decks and bulkheads. Oil storage tank tops and bulkheads adjoining refrigerated chamber(s) also to be shown. (If desired, a separately prepared diagram sheet may be attached by paste or staples provided the size is not greater than that below, all the required particulars are shown and the sheet is signed by the Surveyor.)



No. of refrigerating units 6 Can each unit operate on all chambers? Yes if not, state how connected

Primary refrigerant C Cl<sub>2</sub> F<sub>2</sub> Where specified in the Rules, is the machinery isolated in an efficiently ventilated compartment? Yes  
 Medium for cooling chambers Air circulation system For particulars of refrigerating machinery see 2P6214, 1P-2216, 1P-2217, 1P-3089, 1P3068, 1P-3069 Report No.  
 Diagrammatic sketch sufficient to show relative position (port or starboard, fore or aft) of each compressor, condenser, evaporator (brine cooler), condenser cooling pumps, and brine pumps FR. 96 SECTION (LOOKING FORWARD)



Heat exchangers are not provided for sub-cooling liquid refrigerant however liquid & suction refrigerant lines are tied up together by use of insulation materials for the benefit of sub-cooling liquid refrigerant  
 Is provision made for subcooling the liquid refrigerant (if so, state method) 3 electric generator Condenser cooling medium (if not sea water)

MOTIVE POWER supplied from (state No. of boilers or electric generators) 3 electric generator  
 CONDENSER COOLING PUMPS No. 2 Capacity of each 667 lit./min. 1.6 kg./cm<sup>2</sup>. B.H.P. of driving motors 6 HP  
 Are safety valves fitted where required by the Rules? Yes No. of sea connections 2  
 BRINE PUMPS No. Capacity of each lit./min. galls/hour at head of kg./cm<sup>2</sup>. lbs./in.<sup>2</sup> B.H.P. of driving motors  
 No. of brine temperatures which can be circulated simultaneously Brine system "open" or "closed" type Are safety valves fitted where required by the Rules?  
 Are thermometers fitted to brine delivery and each return pipe? If brine pipes and tanks are galvanized on brine side, is ventilation provided as per Rules?  
 Are steel brine and refrigerant pipes, cooling grids and air cooler coils galvanized externally where required by the Rules?  
 How are the brine and refrigerant steel pipes connected (flanges, butt welds, screw joints, etc.)  
 Where brine pipes are connected by screwed couplings, are the coupling and back nut threads a good fit? What is the pipe thickness at the bottom of the thread?  
 Are the screw threads clear of the coupling coated as required by the Rules? Are air cooler coils parallel to or across the air stream? Parallel  
 Is provision made for air refreshing? Yes If so, are the arrangements in accordance with the Rules? Yes  
 What provision is made for defrosting air cooler coils and/or cooling grids in chambers? Hot gas and hot water.

PARTICULARS OF COOLING APPLIANCES IN EACH CHAMBER  
 Identify each chamber by position (e.g. No. 2 LTD. Port, No. 3 Orlop D., No. 5 L.H. etc.)

Chamber(s)	Capacity measured in accordance with Society's requirements cu. ft.	Roof grids		Side grids		Battery coils			FANS				
		Length in ft.	No. of sections	Length in ft.	No. of sections	Length in ft.	No. of sections	Number	Maximum RPM	Minimum RPM	Cubic ft. of air per minute at maximum RPM	Static water gauge ins.	BHP of fan motor
P. 1	4,584					out. dia. 1" x 2.289	4	1,800	1,200	5,298	1 9/16"	4	outside
S. 1	4,616					do.	4	do.	do.	do.	do.	4	do.
P. 2	2,963					out. dia. 1" x 1.709	3	2,000	1,330	3,532	do.	3	do.
S. 2	2,984					do.	3	do.	do.	do.	do.	3	do.
P. 3	3,592					do.	3	do.	do.	do.	do.	3	do.
S. 3	3,588					do.	3	do.	do.	do.	do.	3	do.

Are air cooler fans reversible? Yes Is access to the refrigerating plant including air cooler fans and their motors, in accordance with the Rules? Yes  
 Can each section of air cooler coils and chamber grids be readily isolated? Yes  
 Where cooling pipes pass through watertight bulkheads or deckplating, are the fittings and gland packing both watertight and fire resisting? Yes  
 PRIMARY REFRIGERANT PIPING (not fabricated at Plant Makers Works) internal diameter and thickness of each size 62.45/2.11, 49.75/2.11, 37.61/1.65, 31.62/1.65, 25.27/1.65, 22.10/1.65, 18.93/1.65, 13/38/1.25, 10.21/1.25, 7.75/0.89, 4.57/0.87 (mm)

Material Copper How manufactured ROLLON Pressure tests 350 lbs./in<sup>2</sup>. hydraulic 200 lbs./in<sup>2</sup>. air 200 lbs./in<sup>2</sup>.  
 Pressure tests after erection 100 lbs./in<sup>2</sup>. gas or air. Brine system pressure test on completion

INSULATION OF BOUNDARIES EXPOSED TO EXTERNAL CONDITIONS

In cols. (1) identify each chamber by position (e.g. No. 2 UTD PORT) with each of its exposed surfaces immediately below (e.g. ship's side, overheading, etc.), where the size of frames etc., change on any surface, give frame Nos. (e.g. Fms. 102 to 109) applicable to each size, on separate lines. Depth of insulation in cols. (3) to exclude any air space, linings, etc.

(1) Chamber(s) and Boundary	(2) Frames, reverse frames, beams, stiffeners, etc., within insulation			(3) Depth of Insulation fitted	(1) Chamber(s) and Boundary	(2) Frames, reverse frames, beams, stiffeners, etc., within insulation			(3) Depth of Insulation fitted	(1) Chamber(s) and Boundary	(2) Frames, reverse frames, beams, stiffeners, etc., within insulation			(3) Depth of Insulation fitted
	Pitch ins.	Width of face ins.	Depth ins.			Pitch ins.	Width of face ins.	Depth ins.			Pitch ins.	Width of face ins.	Depth ins.	
P.1 and S.1					P.2 and S.2					P.3 and S.3				
Ship side frame	800		200	230	Ship side frame	800		200	230	Ship side frame	800		200	230
Do.	Fr. 112, 115, 119, 126	65	200	230	Do.	Fr. 105	90	200	230	Do.	Fr. 62, 66, 73	90	200	230
Web Frame	Fr. 123	150	400	357	Web frame	Fr. 96, 101	150	400	357	Web frame	Fr. 69, 70	90	300	265
For'd Bhd.	740	75	125	230	For'd Bhd.	740	75	125	150	For'd Bhd.	-	-	-	150
Aft Bhd.	-	-	-	150	Aft Bhd.	-	-	-	150	Aft Bhd.	-	-	-	150
Overheading					Overheading					Overheading				
Web beam	Fr. 123	150	500	440	Dk. trans.	Fr. 96, 101, 105	250	350	280	Dk. trans.	Fr. 62, 66, 70	200	350	280
Dk. trans.	Fr. 112, 126	250	350	280	Dk. Longl.	740	90	150	230	Do.	Fr. 73	250	350	280
Do.	Fr. 115, 119	200	350	280	No. 7 Dk. Longl.	Fr. 105, 115	200	350	280	Dk. Longl.	740	90	150	230
Dk. Longl.	740	90	150	230	No. 10 Dk. Longl.	Fr. 96, 112	200	350	280	No. 10 Dk. Longl.	Fr. 73, 77	150	350	280
No. 7 Dk. Longl.	Fr. 105, 115	200	350	280	Inside Bhd.	800	9	100	230	Inside Bhd.	800	9	100	230
No. 10 Dk. Longl.	Fr. 96, 112	200	350	280	Floor	-	-	-	230	Floor	-	-	-	230
Inside Bhd.	800	9	100	230										
Floor	-	-	-	230										

Are all divisional bulkheads of steel construction in accordance with the Rule? Yes If not, state position and when approved

Insulating material(s) (if more than one, state where fitted) Ship sides:- cork board and glass wool Door:- alflex  
All other part:- cork board

Air space, if any, within insulation lining, position and depth Ship side & Bulkhead:- 35 m/m, Upper Deck:- 50 m/m, 2nd Deck:- 30 m/m

Is approved fire resisting insulation fitted in way of coal bunkers and other surfaces exposed to excessive heat? State material fitted  
 Insulation lining(s) material and thickness Inner Lining:- 25mm + 16mm, Soft wood & #26 Galv. Iron Sheet, Out Lining:- 16mm Soft Wood

Methods of securing lining(s) (if timber grounds state whether across face, on face or on sides of frames, etc.) 32mm x 230mm, Wooden furrings on side of frames  
 Floor insulation covering 25mm + 16mm Soft Wood Lining & #22 Galv. Iron Sheet Support for floor covering 32mm x 230mm Wooden Sleepers

State location and thickness of insulation of all insulated hatch coamings exposed to external conditions

Insulation ribbands state where, the insulating material, thickness, width and covering

Hatch covers, type and thickness of insulation Exposed loading and tonnage doors, state thickness of insulation 1" + 2" x 4 Alflex  
 Air ducts buried in insulation, state where P.1 & S.1:- Fr. 113 & 128 of inner Bulkhead, P.2 & S.2:- Fr. 101 & 105 of Upper Deck

Meat rail and/or grid hangers, state in which chambers 350x10+200x15 Dk. trans.:- Fr. 62, 66, 70, 115, 119, 126, 350x10+250x15  
 State location and dimensions of all web frames, deep girders or beams within the insulation Dk. trans.:- Fr. 73, 96, 101, 105, 112, 350x10+150x12 Web Beam:- Fr. 123 Deep Long. 350x10+200x15:- Fr. 73 - 77, 96 - 11  
105 - 115, Web frames 300x90x11/16:- Fr. 69, 70, 400x10+150x12 Fr. 96, 101, 123

State how hold pillars and masts are insulated Derrick posts are insulated with cork boards in P.2 & S.2 Ref. Cargo Space  
 Are air ducts and insulation linings so constructed and erected as to prevent air entering insulation? Yes with galv. iron sheet

Where oil storage tanks adjoin refrigerated chambers, are the arrangements in accordance with the Rules? Yes  
 Is the insulation in way of hatchways on the tank and tunnel tops protected in accordance with the Rules? Yes Are screens fitted over cooling grids on sides of chambers?

Are hatch plugs and their supports; chamber, air cooler and other access doors and frames; closing appliances of tonnage openings; bilge limbers and plugs, satisfactorily fitted and airtight? Yes  
 Are access plugs and/or panels provided in the insulation where required for easy access to the bilges, bilge suction roses, drains, tank manhole doors, air and sounding pipes?

Are cargo battens provided in accordance with the Rules? Dimensions and spacing on sides, vertical surfaces and tunnel top 50x50 230 - 300 apart  
 Have all ventilators and ducts passing through refrigerated chambers to other compartments been made airtight and efficiently insulated?

Where ventilators are provided to refrigerated spaces, are they provided with airtight and insulated closing appliances? Yes  
 Are insulation linings and air screens on the sides of chambers suitably stiffened to prevent crushing by cargo? Yes

Are all steel bolts, nuts, hangers and fixtures which support or secure cooling appliances, insulation, meat rails, etc., galvanized? Yes  
 Is the insulation and air ducting in accordance with the approved plans and specification? Yes

The foregoing is a correct description of the insulation and appliances.  
T. Ahmad  
 Senior Managing Director.  
 Builders or Insulation Contractors



Do all pipes, including scupper pipes, air pipes and sounding pipes which pass through refrigerated chambers comply with, and are they erected and insulated in accordance with the Rules? **Yes**

Are air cooler trays provided in accordance with the Rules? **Yes** Are the drainage arrangements of the refrigerated chambers, cooler trays and air spaces behind insulation in accordance with the Rules? **Yes** Has the spare gear (see Report 17(a)) been placed on board? **Yes**

Are liquid sealed traps provided as required by the Rules? **Yes** Where the installation is on a ship not classed or intended to be classed with the Society, have the generator engines and electrical equipment which supply power to the refrigerating plant been examined generally and under working conditions and found sufficient and satisfactory? **Yes**

Is a separate plant fitted for ships stores and/or air conditioning purposes? **Yes** Steam or oil engines driving refrigerant compressors. Report 4c, Port **No**

Where the machinery is driven by steam engines, is the exhaust steam connected to the main and auxiliary condensers? **No**

Motors over 100 BHP driving refrigerant compressors. Port **Kobe** Certificate Nos. **DC M. 1219, 1220, 1221, 1222, 1223, 1224 (1228, 1229)**

Air cooler fan driving motors. Port **Kobe** Certificate Nos. **DC M. 1219, 1220, 1221, 1222, 1223, 1224 (1228, 1229)**

Motors under 100 BHP driving refrigerant compressors. Have makers' certificates been obtained? **Yes** Are certificates attached? **Yes**

DISTANCE READING THERMOMETERS: Are they approved type? **No** Makers **Shimazu Seisakusho** Type **ARB-212** Where tube thermometers are fitted, are the tubes in accordance with the Rule requirements? **Yes** No. and position of thermometers in the cargo space and air ducts of each chamber. **One thermometer tube on Upper Dk for each cargo space and one thermometer at each door.**

For inlet and outlet air duct:- each one

TESTS AFTER COMPLETION: Have the thermometers provided for measuring chamber, air suction and air delivery temperatures been checked for accuracy and found in order? **Yes**

Have the air cooler fans been tested? **Yes** (the statements showing the results of these tests to be attached to the report). Have the air distribution arrangements in each chamber been checked and found satisfactory? **Yes** Has all the plant been tested under working conditions? **Yes** Where a plant is operated by thermostatic refrigerant control, are the arrangements for manual control in accordance with the Rules? **Yes** Have the manual controls been tested? **Yes** Were all the plant electrical instruments, gauges and thermometers checked for accuracy before the commencement of the refrigeration test? **Yes** Have the air cooler defrosting arrangements been tested? **Yes**

REFRIGERATION TEST. When did cooling down chamber(s) commence? Date **30-6-58** Time **16 H.** When was the desired temperature of **19.1 °C** attained in the chambers? Date **1-7-58** Time **18 H.** When was the balance test commenced? Date **2-7-58** Time **18 H.** When was the Balance Test completed? Date **3-7-58** Time **24 H.**

Log sheets of the chamber and external temperatures, machinery operating conditions including fan and brine pump motor particulars, also a copy of the sheet showing the calculations of the estimate of the theoretical heat leakage on the average temperatures during the balance test period, to be attached to the report.

TOTAL THEORETICAL HEAT LEAKAGE DURING THE BALANCE TEST PERIOD

MEASURED HEAT LEAKAGE

Through surfaces, etc., of cargo chambers, brine rooms, cooler houses, etc. **95868.77** ~~BTU/hr~~

Through refrigerant leads ... **13531** ~~BTU/hr~~

Total ... **109399.77** ~~BTU/hr~~

Compressor Operating Conditions:

State which compressor(s) used **No. 1, 3, 4 (25 HP) & No. 5 (8 HP)**

Average evaporator gauge **-18** ~~°F~~ **-18** ~~°F~~

Average condensing temperature **82** ~~°F~~ **82** ~~°F~~

Compressor R.P.M. **600**

Machine output from curves **53500** ~~BTU/hr~~ **1560** ~~BTU/hr~~

Fan, brine pump etc., heat load.

Average total fan heat load **57682.944** ~~BTU/hr~~

Average total brine pump heat load **-** ~~kg. cal./hr BTU/hr~~

Any other heat load such as heaters in chamber **-** ~~kg. cal./hr BTU/hr~~

Total of above loads **57682.944** ~~BTU/hr~~

Total measured heat leakage load **118417.056** ~~BTU/hr~~

$$\text{Ratio} = \frac{\text{measured heat leakage}}{\text{theoretical heat leakage}} = \frac{118417.056}{109399.77} = 1.088$$

Maximum ratio permissible for temperature qualification desired by Owners (state head office figure).

**1.43**

If the arrangements and details are not precisely in accordance with the approved specifications and plans, have full details of deviations been forwarded with this Report? **No**

Is the refrigerated cargo installation a duplicate of a previous case? **No** If so, state name of vessel or Yard and Yard No. **completed.**

If the survey is not complete, state what arrangements have been made for its completion and what remains to be done. **completed.**

GENERAL REMARKS. (State whether installation has been constructed under special survey in accordance with the Rules, approved plans and Secretary's letters. State quality of materials and workmanship, opinions as to class, etc.)

The Refrigerated Cargo Installation of this vessel has been built and installed under Special Survey in accordance with the Rules, Approved Plans and Secretary's letters.

The materials and workmanship are sound and good.

The installation has been examined under full working conditions and found satisfactory.

In our opinion this Refrigerated Cargo Installation is worthy of the record of **LLOYD'S RMC 7, 58.**

PARTICULARS FOR REGISTER BOOK

MACHINERY

No. of units **6** Prime movers **Electric Motor**

Total BHP of all Compressor prime movers **116 HP**

Refrigerant **C CL<sub>2</sub> F<sub>2</sub>**

Makers **Mitsui S.B. & Eng. Co., Ltd.** Date of Construction **24th May, 1958**

Machinery particulars "RL-80" "RL-20"

Diameter of cylinder **170 m/m** **100 m/m**

Diameter of rotary piston **135 "** **80 "**

Length of cylinder & piston **340 "** **200 "**

Revolutions per minute **800/640** **1210/970**

Ton per day **7.4** **2.8**

Motor horse power **25/20 HP** **8/6.5 HP**

Survey Fee **See Rpt. 17(a)-5921** Fee applied for, **See Rpt. 1**

Travelling Expenses **See Rpt. 1** Received by me, **[Signature]**

Date of Committee **TUESDAY 7<sup>th</sup> OCT 1958**

Class assigned **Lloyds RMC 7, 58 to maintain temp. 0°F with sea temp. 90°F maximum**

CARGO CHAMBERS

Total capacity in cubic feet **22,327** Total No. **6**

No. Independent **6** No. independently refrigerated **6**

Method of Cooling **Cold air circulation over direct expansion batte**

Insulating material(s) **Cork board & glass wool**

Insulation lining **25 m/m, 16 m/m, soft wood & galv. iron sheet**



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