

Rpt. 17 (b)

Date of writing Report 1 July 1960
Survey held at Yokohama

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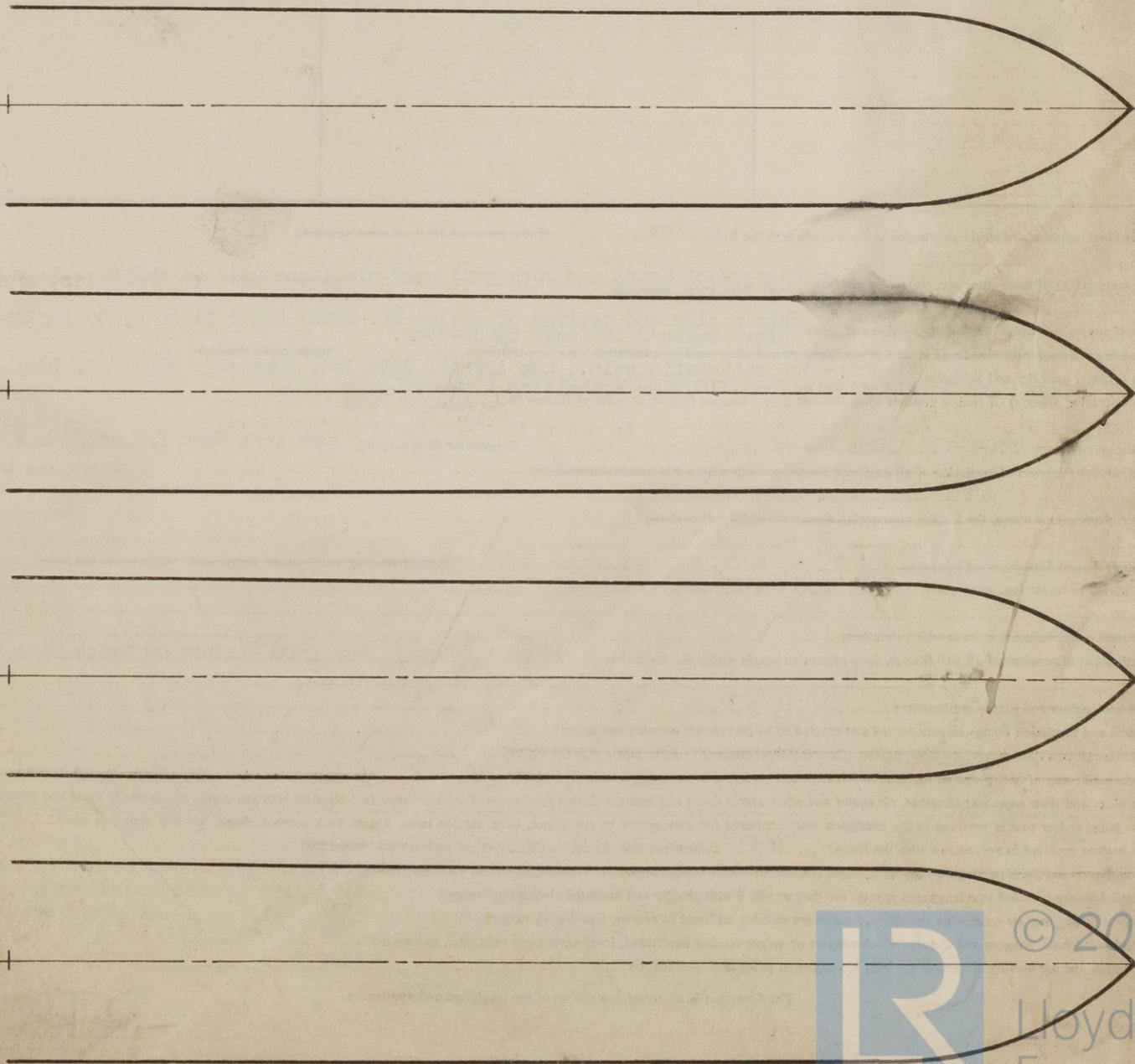
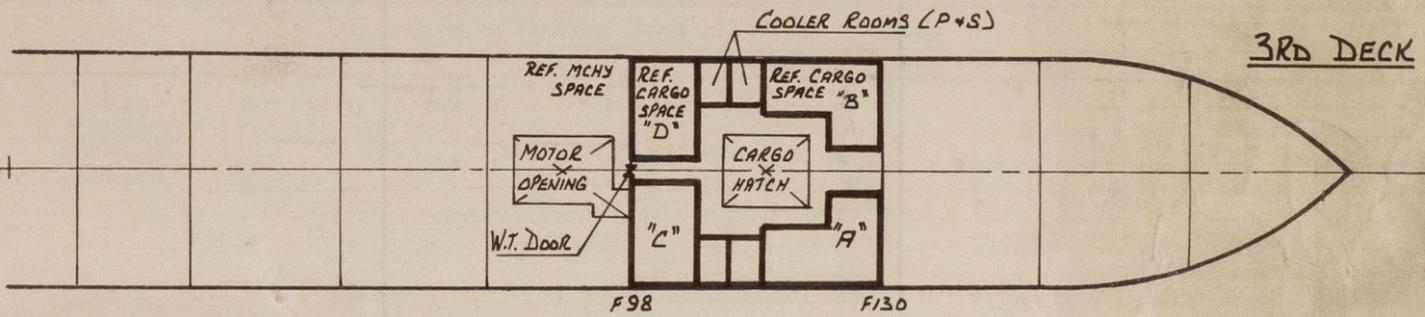
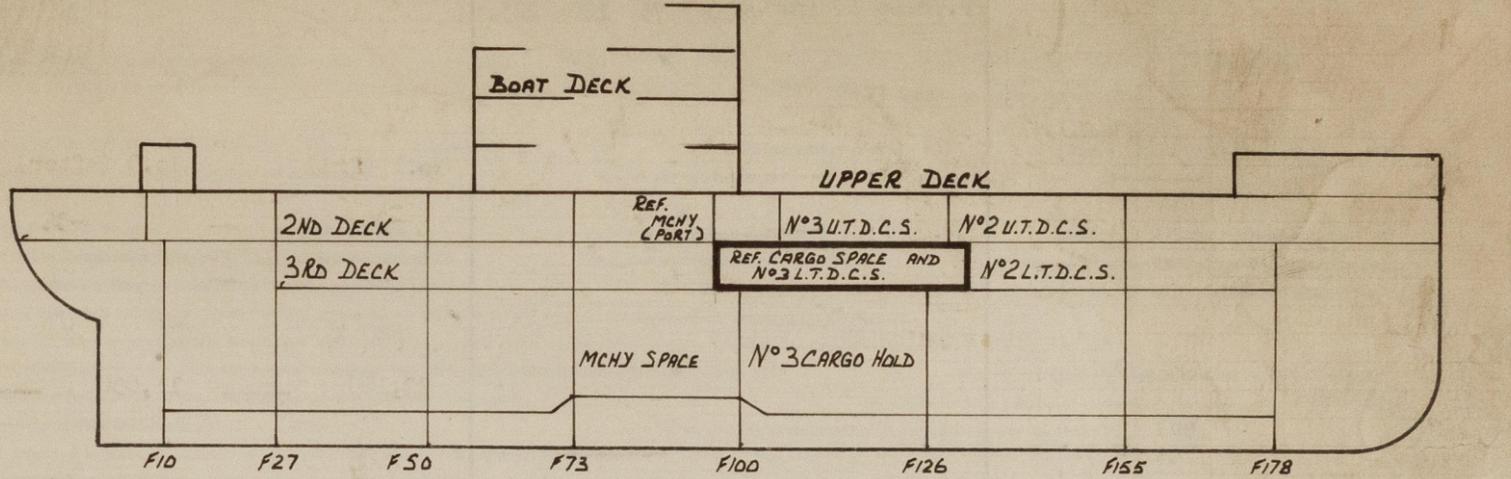
Port YOKOHAMA
First date 26-2-1960

No. 3311-E
Last date 28-6-1960

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

No. in R.B. 44538 Name SUMIDA MARU Gross tons 9431
 Built at Yokohama By whom Mitsubishi Nippon Hvy Ind. Yard No. S 836
 Owners Nippon Yusen Kaisha Port of Registry Tokyo
 Refrigerating Machinery made by The Sabroe Co. of Japan Ltd., Osaka Machine Nos. 1-33106; 2-33107; 3-33108 When made 12 - 1959
 Insulation fitted by Kyoiei Sangyo K.K., Yokohama Total No. of Chambers 4
 Total refrigerated cargo capacity measured in accordance with Society's requirements 16,785 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.)



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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. Fns. 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 mm.	Width of face mm.	Depth mm.			Pitch mm.	Width of face mm.	Depth mm.			Pitch mm.	Width of face mm.	Depth mm.	
REF. CARGO SPACE "A" ("B") No. 3 L.T.D. Stbd. Port					REF. CARGO SPACE "C" ("D") No. 3 L.T.D. Stbd. Port					COOLER ROOMS No. 3 L.T.D. Port & Stbd.				
FRD Bulkhead	-	-	-	200	AFTER Bulkhead	700/750	90	150	250	SHIP'S Side	800	90	210	250
Ship's Side	800	90	210	250	Ship's Side	800	90	210	250	Deck Over	800	90	220	250
Deck Over	800	90	220	250	Deck Over	800	90	220	250	Deck Under	-	-	-	175
" " in way of Hatch Side Girders	-	200	588	100	" " in way of Hatch Side Girders	-	520	588	100	Hatch Side Wall	800	75	75	175
Deck Under	-	-	-	200	Deck Under	-	-	-	200					
Hatch Side Wall	800	75	75	225	Hatch Side Wall	800	75	75	225					
					Hatch Side Wall Fr. 98 to 108 (port)	800	75	100	225					

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) **Glass wool board and rock wool used simultaneously on ship's side and ceiling of Ref. Cargo Spaces and under floor of Cooler rooms.**

Air space, if any, within insulation lining, position and depth **Ship's side and ceiling of Cooler Rm. - 80mm; Under floor of Cooler Room - 230mm; After bulkhead of Cargo Space - 75mm.**

Is approved fire resisting insulation fitted in way of cool bulkheads and other surfaces exposed to excessive heat? **State material fitted -**

Insulation lining(s) material and thickness **Floors: - 5mm Bitumastic soln., 4mm ASPHALT SHEETING, 30mm soft wood T/G, 10mm DEX-O-TEX**

Methods of securing lining(s) (if timber grounds state whether across face, on face or on sides of frames etc.) **Ceiling and ship's side: - 16mm T/G, 4mm asphaltting 4mm soft wood T/G. ACROSS FACE**

Floor insulation covering **DEX-O-TEX 10mm Thick** Support for floor covering **30mm soft wood T/G on 50 x 200mm high joists**

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**

Air ducts buried in insulation, state where **Ship's Sides in Cooler Rooms**

Meat rail and/or grid hangers, state in which chambers

State location and dimensions of all web frames, deep girders or beams within the insulation **520mm x 588mm x 38mm Deep Girders on Hatch Side Lines**

State how hold pillars and masts are insulated

Are air ducts and insulation linings so constructed and erected as to prevent air entering insulation? **Yes**

Where oil storage tanks, other refrigerated chambers, are the arrangements in accordance with the Rules? **Yes**

Is the insulation in way of machinery on the tank and tank 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? **Yes**

Are cargo battens provided in accordance with the Rules? **Yes** Dimensions and spacing on sides, vertical surfaces and tunnel top

Have all ventilators and ducts passing through refrigerated chambers to other compartments been made airtight and efficiently insulated? **Yes**

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**

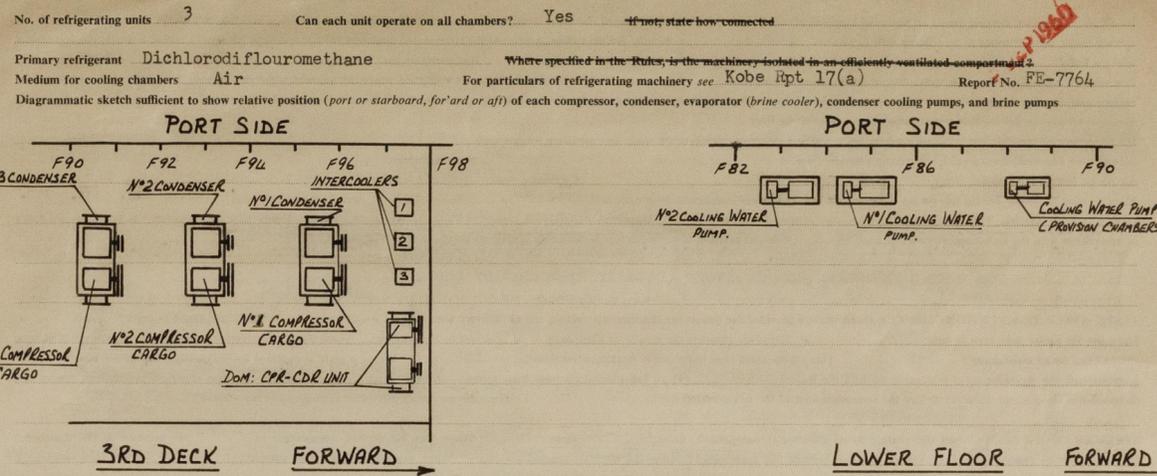
Are all steel bolts, nuts, hangers and fixtures which support or secure cooling appliances, insulation, meat rails, etc., galvanized? **Yes**

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.

R. Tamoda
Builders or Insulation Contractors

Yokohama Shipyard & Engine Works



Is provision made for subcooling the liquid refrigerant (if so, state method) **Yes, Each unit has liquid sub-cooling type intercooler**

MOTIVE POWER supplied from (state No. of boilers or electric generators) **3 Electric Generators** Condenser cooling medium (if not sea water)

CONDENSER COOLING PUMPS No. **2** Capacity of each **600** lit./min. **1.6** kg./cm². B.H.P. of driving motors **7.5**

Are safety valves fitted where required by the Rules? **Yes** No. of sea connections **3**

BRINE PUMPS No. Capacity of each lit./min. gal./hour at head of kg./cm². 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? **Yes** 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? **Yes**

How are the brine and refrigerant steel pipes connected (flanges, butt welds, screw joints, etc.) **Flanged 25%; Butt welds 75%**

Where brine pipes are connected by screwed couplings, are the coupling and back nut threads a good fit? **Yes** 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? **Yes** 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 C, Cl₂ F₂ or Hot Sea Water Spray**

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	Motor inside or outside insulated envelope
"A" (ssf)	-	-	-	-	-	2306	12	1	1730	1165	4768	1.065	3.5	Inside
"B" (psf)	-	-	-	-	-	2306	12	1	1730	1165	4768	1.065	3.5	Inside
"C" (ssa)	-	-	-	-	-	2306	12	1	1730	1165	4768	1.065	3.5	Inside
"D" (psa)	-	-	-	-	-	2306	12	1	1730	1165	4768	1.065	3.5	Inside

Are air cooler fans reversible? **No** 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? **No**

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 (mm.) **62.45 x 2.11; 49.75 x 2.11; 37.61 x 1.65; 25.27 x 1.65; 22.1 x 1.65; 18.93 x 1.65; 16.55 x 1.25; 13.38 x 1.25.**

Material **Copper** How manufactured **Seamless** Pressure tests **350** kg./cm² lbs./in² hydraulic **200** kg./cm² lbs./in² air

Pressure tests after erection **100** kg./cm² lbs./in² gas or air. Brine system pressure test on completion



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** Are liquid sealed traps provided as required by the Rules? **Yes** Has the spare gear (see Report 17(a)) been placed on board? **Yes**
 Is a separate plant fitted for ships stores and/or air conditioning purposes? **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**
 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 **Yokohama** Certificate Nos. **3060 (Nippon Electric Industry Co., Ltd.)**
 Air cooler fan driving motors. Port **Yokohama** Certificate Nos. **3060 (Nippon Electric Industry Co., Ltd.)**
 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 **Yokohama Electric Co., Ltd.** 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. **CHAMBERS: - FORWARD - one each p & s in ceiling, AFTER - one each p & s in frd wall.**
AIR DUCTS - one each in suction and delivery ducts in each Cooler room.

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 **19-6-60** Time **1300 Hr.** When was the desired temperature of **-20° C.** attained in the chambers? Date **20-6-60** Time **0430 Hrs.** When was the balance test commenced? Date **21-6-60** Time **0800 Hr.** When was the Balance Test completed? Date **21-6-60** Time **1400 Hr.**
 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. **15,504.5** kg. cal./hr
 Through refrigerant leads **248.5** kg. cal./hr
 Total **15,753** kg. cal./hr

Compressor Operating Conditions:

State which compressor(s) used	No. 1 (frd)	No. 3 (after)
Average evaporator gauge	-34 °C	-34 °C
Average condensing temperature	26 °C	26 °C
Compressor R.P.M.	520	260
Machine output from curves	22,100 kg. cal./hr	11,050 kg. cal./hr
Fan, brine pump etc., heat load.		
Average total fan heat load	9,260 kg. cal./hr	
Average total brine pump heat load		
Any other heat load such as heaters in chamber		
Total of above loads		
Total measured heat leakage load	23,890 kg. cal./hr	

Ratio $\frac{\text{measured heat leakage}}{\text{theoretical heat leakage}} = \frac{23,890}{15,753} = 1.51$

Maximum ratio permissible for temperature qualification desired by Owners (state head office figure). **1.6**

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? **Yes**
 Is the refrigerated cargo installation a duplicate of a previous case **Yes** if so, state name of vessel or Yard and Yard No. **SAITAMA MARU**
 If the survey is not complete state, what arrangements have been made for its completion and what remains to be done **Survey Complete**

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 installation has been constructed under Special Survey in accordance with the Rules, approved plans and Secretary's letters.

The materials and workmanship are satisfactory.

It is submitted that the installation is eligible to be Classed in the Register Book with date of Classification **6/60** and notation **† LLOYD'S RMC**, to maintain temperature **1°F.** with sea temperature **90°F.** maximum.

PARTICULARS FOR REGISTER BOOK

MACHINERY
 No. of units **3** Prime movers **Electric Motor**
 Total BHP of all Compressor prime movers **90 bhp.**
 Refrigerant **Dichlorodifluoromethane**
 Makers **Sabro Co. of Japan Ltd.** Date of Construction **1960-2**
 Machinery particulars
3-3 Cyl. SA Com. Compressors 150 x 125mm x 500 rpm.
3- S & T Condensers

CARGO CHAMBERS
 Total capacity in cubic feet **16785** Total No. **4**
 No. Independent **4** No. independently refrigerated **4**
 Method of Cooling **Direct Expansion and Air**
 Insulating material(s) **Glass Wool and rock wool**
 Insulation lining **Timber**

Survey Fee **INSURANCE £55,650**
 Travelling Expenses **INSURANCE £55,800**
 Date of Committee **FRIDAY 7 OCT 1960**
 Class assigned **† Lloyd's RMC. 6.60**
†
"to maintain temp. 1°F. with sea temp. 90°F. max."



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