

REPORT ON STEAM RECIPROCATING ENGINE MACHINERY.

Received at London Office - 8 FEB 1933

Date of writing Report 19 When handed in at Local Office 6. 2. 1933 Port of Glasgow
 No. in Survey held at Glasgow Date, First Survey 18. 2. 32 Last Survey 2. 2. 1933
 Reg. Book. on the new steel s/s "HARDINGHAM" (Number of Visits 95)
 Built at Port Glasgow By whom built Lithgous Ltd Yard No. 858 Tons { Gross 5415 Net 3208
 Engines made at Glasgow By whom made David Rowan & Co Engine No. 947 When made 1932
 Boilers made at Glasgow By whom made David Rowan & Co Boiler No. 947 When made 1932
 Registered Horse Power - Owners J & C. Harrison Ltd Port belonging to London
 Nom. Horse Power as per Rule 502 NHP 544 Is Refrigerating Machinery fitted for cargo purposes no Is Electric Light fitted yes

Trade for which Vessel is intended *LT Tank 4600 NHP*
 Note: The diameter of the HP cylinder has been reduced to 23 1/2" to give the same IHP with LP turbine as 25" gave without LP turbine in duplicate case "Harmatrus"
 The amended Rule size of shafting are calculated for reduced diameter of HP cylinder.

ENGINES, &c. - Description of Engines Triple expansion Revs. per minute 73
 Dia. of Cylinders 25" - 43" - 72" Length of Stroke 48" No. of Cylinders 3 No. of Cranks 3
 Crank shaft, dia. of journals 23 1/2" as per Rule 13.726 Crank pin dia. 14 3/4" Crank webs Mid. length breadth 23" Thickness parallel to axis 9 1/4" as fitted 14 3/4" Mid. length thickness 9 1/4" shrunk Thickness around eye-hole 6 3/4"
 Intermediate Shafts, diameter as per Rule 13.52" as fitted 13 5/8" Thrust shaft, diameter at collars as per Rule 14.14" as fitted 14 3/4" (Mitchell)
 Tube Shafts, diameter as per Rule 15.74" as fitted 15 7/8" Is the tube shaft fitted with a continuous liner? yes

Bronze Liners, thickness in way of bushes as per Rule 13.16" as fitted 13 1/16" Thickness between bushes as per Rule 54" as fitted 56.25" Is the after end of the liner made watertight in the propeller boss yes If the liner is in more than one length are the junctions made by fusion through the whole thickness of the liner -
 If the liner does not fit tightly at the part between the bearings in the stern tube, is the space charged with a plastic material insoluble in water and non-corrosive yes
 If two liners are fitted, is the shaft lapped or protected between the liners - Is an approved Oil Gland or other appliance fitted at the after end of the tube shaft no If so, state type - Length of Bearing in Stern Bush next to and supporting propeller 5-3 1/2"

Propeller, dia. 18 1/2" Pitch 11-9 to 19-3 No. of Blades 4 Material bronze whether Moveable yes Total Developed Surface 92.5 sq. feet
 Feed Pumps worked from the Main Engines, No. None Diameter - Stroke - Can one be overhauled while the other is at work -
 Bilge Pumps worked from the Main Engines, No. 2 Diameter 4 1/2" Stroke 24" Can one be overhauled while the other is at work yes
 Feed Pumps { No. and size 2 @ 7" - 9 1/2" x 21" Pumps connected to the Main Bilge Line { No. and size Ballast pump (4 ME pumps?)
 How driven steam How driven steam

Ballast Pumps, No. and size 1 @ 12" - 10 1/2" x 24" Lubricating Oil Pumps, including Spare Pump, No. and size -
 Are two independent means arranged for circulating water through the Oil Cooler - Suctions, connected to both Main Bilge Pumps and Auxiliary Bilge Pumps; - In Engine and Boiler Room 3 @ 3" In Holds, &c. N° 1 - 2 @ 3", N° 2 - 2 @ 3 1/2", Brushhopper - 2 @ 2 1/2"
 In Pump Room - Dry Tank - 1 @ 2 1/2", N° 3 - 4 @ 2 1/2", N° 4 - 2 @ 3", Tunnel Well - 1 @ 2 1/2". Fitted at Gpk

Main Water Circulating Pump Direct Bilge Suctions, No. and size 1 @ 8" Independent Power Pump Direct Suctions to the Engine Room Bilges, No. and size 1 @ 4 3/4" Are all the Bilge Suction Pipes in holds and tunnel well fitted with strum-boxes yes
 Are the Bilge Suctions in the Machinery Space led from easily accessible mud-boxes, placed above the level of the working floor, with straight tail pipes to the bilges yes
 Are all Sea Connections fitted direct on the skin of the ship yes Are they fitted with Valves or Cocks both
 Are they fixed sufficiently high on the ship's side to be seen without lifting the stokehold plates yes Are the Overboard Discharges above or below the deep water line both
 Are they each fitted with a Discharge Valve always accessible on the plating of the vessel yes Are the Blow Off Cocks fitted with a spigot and brass covering plate yes
 What Pipes pass through the bunkers forward hold suction How are they protected under timber boards
 What pipes pass through the deep tanks - Have they been tested as per Rule -
 Are all Pipes, Cocks, Valves, and Pumps in connection with the machinery and all boiler mountings accessible at all times yes
 Is the arrangement of Valves and their connections such as to prevent the possibility of water passing from the sea or from water tanks into the cargo or machinery spaces, or from one compartment to another yes Is the Shaft Tunnel watertight yes Is it fitted with a watertight door yes worked from bridge deck

MAIN BOILERS, &c. - (Letter for record (r)) Total Heating Surface of Boilers 6850 sq ft
 Is Forced Draft fitted yes No. and Description of Boilers 2 SB & 1 aux Working Pressure 220
 IS A REPORT ON MAIN BOILERS NOW FORWARDED? yes also on auxiliary boiler.
 IS A DONKEY BOILER FITTED? no If so, is a report now forwarded? -
 Is the donkey boiler intended to be used for domestic purposes only -
 PLANS. Are approved plans forwarded herewith for Shafting no Main Boilers yes Auxiliary Boilers yes Donkey Boilers -
 (If not state date of approval) Superheaters no General Pumping Arrangements no Oil fuel Burning Piping Arrangements -

SPARE GEAR.
 Has the spare gear required by the Rules been supplied yes
 State the principal additional spare gear supplied Two cast iron propeller blades, one propeller shaft, one spindle for centrifugal circulating pump.
 For Andrews & Cameron HP valve gear - one steam valve rod, one exhaust valve rod, two crosshead blocks for valve rods, two crosshead pins for valve rods, four cam rollers.

The foregoing is a correct description,
 For David Rowan & Co. Ltd
 Archd. W. Grierson Manufacturer.
 Lloyd's Register Foundation
 W 405-0095

1932 July: 18 Apr: 7 May: 5 20 30 June: 1 16 20 29 July: 5 Aug: 1 2 8 12 16 19 20 21
 During progress of work in shops -- 24 26 29 Sep: 1 2 5 6 7 12 14 15 20 22 23 27 28 30 Oct: 3 4 5 6 12 18 19 20 21
 Dates of Survey while building During erection on board vessel --- 20 27 28 Nov: 1 2 3 4 7 8 14 16 17 22 23 24 25 28 29 30 Dec: 1 2 5 6 7 8 9 12 13
 15 19 20 21 22 27 30 (1933) Jan: 9 11 12 13 16 17 19 23 24 25 26 27 28 30 Feb: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
 Total No. of visits - 95 -

Dates of Examination of principal parts—Cylinders 17-11-32 Slides 8-12-32 Covers 14-11-32
 Pistons 19-10-32 Piston Rods 7-12-32 Connecting rods 19-8-32
 Crank shaft 24-11-32 Thrust shaft 2-12-32 Intermediate shafts 3-11-32
 Tube shaft ✓ Screw shaft 30-11-32 5-12-32 Propeller 3-11-32
 Stern tube 29-11-32 Engine and boiler seatings GUK Engines holding down bolts 12-1-33
 Completion of fitting sea connections GUK
 Completion of pumping arrangements 23-1-33 Boilers fixed 23-1-33 Engines tried under steam 2-2-33
 Main boiler safety valves adjusted 28-1-33 Thickness of adjusting washers Piston 1/8" Slide 1/16" Piston Rod 1/16" S 1/2"
 Crank shaft material J. Steel Identification Mark LLOYD'S No 4351 L.C.D. 24-11-32 Thrust shaft material J. Steel Identification Mark LLOYD'S No 4351 L.C.D. 2-12-32
 Intermediate shafts, material J. Steel Identification Marks LLOYD'S No 4351 L.C.D. 3-11-32 Tube shaft, material - Identification Mark ✓
 Screw shaft, material J. Steel Identification Mark LLOYD'S No 4351 L.C.D. 30-11-32 Steam Pipes, material Steel Test pressure 660 Date of Test 20-10-32
 Is an installation fitted for burning oil fuel no Is the flash point of the oil to be used over 150°F. -
 Have the requirements of the Rules for the use of oil as fuel been complied with -
 Is the vessel (not being an oil tanker) fitted for carrying oil as cargo - If so, have the requirements of the Rules been complied with -
 If the notation for Ice Strengthening is desired, state whether the requirements in this respect have been complied with -
 Is this machinery duplicate of a previous case. Yes If so, state name of vessel "Harmatis" Gls Rpt. No 52530
 With compressor - "Harlingen" Gls Rpt. No 53200

General Remarks (State quality of workmanship, opinions as to class, &c.)
 I am operated HP valve gear fitted. Approved plan forwarded with Gls Rpt. No 52530
 These engines are fitted with an exhaust turbine driving (on the same shaft) a rotary compressor (don lts 30-6-32)
 The compressor takes the whole of the exhaust steam from the MP cylinders and delivers it at a higher pressure and temperature to the MP casing. Receiver fitted between compressor and MP
 The turbine can be readily bypassed and the engines worked as an ordinary triple expansion unit.
 The turbo compressor was made by Messrs A & G Götaverken of Gothenburg and fitted in the vessel at this port by Messrs David Rowan & Co Ltd.
 The main engines and the turbo compressor worked satisfactorily during the sea trials and the following data maybe taken as representative of their performance.

	HP STEAM	HP EXHAUST	TEMPERATURE HP EXHAUST	MP STEAM	TEMPERATURE MP STEAM	LP STEAM	LP EXHAUST	CONDENSER	REYS
TURBINE OUT	220	38	-	38	-	2	25 1/2"	28"	70
TURBINE IN	220	34	390°F	50	470°F	5	18 1/2"	28"	74

The materials and workmanship are good.
 The machinery has been constructed under special survey and is eligible in my opinion for classification and the Records of L.M.C. 2.33 "Exhaust turbine driving steam compressor".

The amount of Entry Fee ... £ 6 :
 Special ... £ 100 : 2
 Donkey Boiler Fee ... £ 6 : 6
 Travelling Expenses (if any) £ : :
 When applied for, 3. 2. 19. 33
 When received, 13. 2. 19. 33

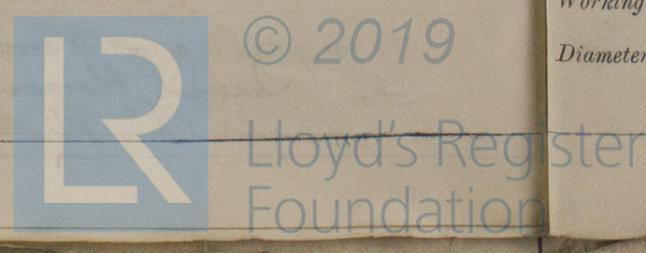
L.D. Davis
 Engineer Surveyor to Lloyd's Register of Shipping.

Committee's Minute GLASGOW 7 FEB 1933

Assigned + L.M.C. 2.33. 73.

Exhaust turbine driving steam compressor.

CERTIFICATE WRITTEN.



GLASGOW

The Surveyors are requested not to write on or below the space for Committee's Minute.