

pt. 4a.

REPORT ON STEAM TURBINE MACHINERY. No. 2954.

Received at London Office...
 Date of writing Report 21-8-1943 When handed in at Local Office 24-8-1943 Port of Barrow
 No. in Survey held at Barrow Date, First Survey 2-6-42 Last Survey 16-8-1943
 Reg. Book. on the S.S. EMPIRE VICEROY (Number of Visits 125.)

Tons Gross 7803 Net 4475
 Built at Barrow By whom built Vickers Armstrongs Ltd. Yard No. 858 When built 1943.7
 Engines made at Hartlepool By whom made Richardsons Lestgarth & Co. Engine No. 2734 When made do.
 Boilers made at do By whom made do Boiler No. do When made do.
 Shaft Horse Power at Full Power 8000 Owners The Ministry of War Transport Port belonging to Barrow
 Nom. Horse Power as per Rule 1415.1388 Is Refrigerating Machinery fitted for cargo purposes No Is Electric Light fitted Yes
 Trade for which Vessel is intended Ocean going

TEAM TURBINE ENGINES, &c.—Description of Engines Three turbines geared with double reduction to one shaft.
 No. of Turbines Ahead 3 Direct coupled, single reduction geared } to One propelling shafts. No. of primary pinions to each set of reduction gearing 3.
 Astern 2 double reduction geared }
 Direct coupled to Alternating Current Generator phase periods per second }
 Direct Current Generator rated Kilowatts Volts at revolutions per minute;
 or supplying power for driving Propelling Motors, Type
 at Kilowatts Volts at revolutions per minute. Direct coupled, single or double reduction geared to One propelling shafts.

TURBINE LOADING.	H. P.			I. P.			L. P.			ASTERN.		
	HEIGHT OF BLADES.	DIAMETER AT TIP.	NO. OF ROWS.	HEIGHT OF BLADES.	DIAMETER AT TIP.	NO. OF ROWS.	HEIGHT OF BLADES.	DIAMETER AT TIP.	NO. OF ROWS.	HEIGHT OF BLADES.	DIAMETER AT TIP.	NO. OF ROWS.
1st EXPANSION	75"	16.5"	8	1.05"	21.1"	3	2"	4.4"	1	94" Rotor	28.44"	1
2nd	88"	16.76"	8	1.35"	21.7"	3	2.439"	4.4"	1	19"	29.65"	1
3rd	1.10"	17.2"	8	1.8"	22.6"	3	3.135"	Cyl. BORE	1	5"	33"	1
4th	1.40"	17.8"	8	2.6"	24.2"	3	3.835"	BORE	1			
5th				3.2"	25.4"	2	4.534"	TAPERED	1			
6th							5.334"	BETWEEN	1			
7th							6.147"	1st & 11th	1	2.75" Rotor	55.25"	1
8th							7.09"	EXPANSIONS	1	4.7"	57.45"	1
9th							8.04"		1	6"	59"	1
10th							9.2"		1			
11th							10"	60"	1			

Shaft Horse Power at each turbine { H.P. 2667 I.P. 2667 L.P. 2667 }
 Reolutions per minute, at full power, of each Turbine Shaft { H.P. 4467 I.P. 4467 L.P. 2395 }
 Motor Shaft diameter at journals { H.P. 5" I.P. 5" L.P. 8" }
 Pitch Circle Diameter { 1st pinion 14.782 1st reduction wheel 49.918 2nd pinion 19.018 main wheel 134.928 }
 Width of Face { 1st reduction wheel 21" (+3 gap) main wheel 33 1/2" (+25 gap) }

Distance between centres of pinion and wheel faces and the centre of the adjacent bearings { 1st pinion 10" 1st reduction wheel 2'-6 1/2" 2nd pinion 16 3/8" main wheel 19 1/8" }
 Flexible Pinion Shafts, diameter { 1st 11" 2nd 19" }
 Pinion Shafts, diameter at bearings { 1st 11" 2nd 19" }
 External diameter at bottom of pinion teeth { 1st 7.41" 2nd 14.266" }
 Internal diameter at bottom of pinion teeth { 1st 12" 2nd 18.17" }

Wheel Shafts, diameter at bearings { 1st 11" 2nd 19" }
 diameter at wheel shroud, { 1st 3'-9 1/4" 2nd 10'-9 1/4" }
 Generator Shaft, diameter at bearings None
 Propelling Motor Shaft, diameter at bearings None
 Intermediate Shafts, diameter as per rule 17.24" as fitted 17.38"
 Thrust Shaft, diameter at collars as per rule 18.82" as fitted 18.4" (18 1/8" clear of bearings.)

Tube Shaft, diameter as per rule 18.82" as fitted 19.4"
 Screw Shaft, diameter as per rule 18.82" as fitted 19.4"
 Is the shaft fitted with a continuous liner Yes
 Bronze Liners, thickness in way of bushes as per rule 8.77" as fitted 15/16"
 Thickness between bushes as per rule 6.57" as fitted 13/16"
 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 Yes

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
 Two liners are fitted, is the shaft lapped or protected between the liners Yes
 Is an approved Oil Gland or other appliance fitted at the after end of the tube Yes
 Length of Bearing in Stern Bush next to and supporting propeller 6'-5 1/8"
 Propeller, diameter 19'-0" Pitch 18'-6" No. of Blades 4 State whether Movable No Total Developed Surface 125 square feet.

Single Screw, are arrangements made so that steam can be led direct to the L.P. Turbine Yes Can the H.P. or I.P. Turbine exhaust direct to the condenser Yes
 No. of Turbines fitted with astern wheels 2 Feed Pumps No. and size 2 in No. - 3 1/2" Wiers Turbine Feed pumps.
 How driven Steam @ 400 lbs/sq

Pumps connected to the Main Bilge Line { No. and size 1- Fire Bilge 80/100 lons/h Centrex & 1- Ballast 250 lons/h Centrex. }
 How driven Electric Motors
 Ballast Pumps, No. and size 1- 250 lons/h 1- 150 lons/h } Centrex Lubricating Oil Pumps, including Spare Pump, No. and size 2- 5"
 Are two independent means arranged for circulating water through the Oil Cooler Yes Suctions, connected to both Main Bilge Pumps and Auxiliary Bilge pumps, No. and size:—In Engine and Boiler Room 3 @ 3 1/2", One @ 5", One @ 3 1/2" in Cofferdams, One 3" in Pump Room Lub Oil Cofferdam.

Holds, &c. F.P. & Trimming Tanks 1 @ 3 1/2" dia. A.P.T. One @ 3". D.B.T's. No. 1 & 2. One port & one starboard 3 1/2" dia. No. 3 & 4. 2 Port & 2 Starboard 3 1/2" For Bunkers 1 @ 4 1/2" Aft Bunkers 1 @ 3 1/2"
 Main Water Circulating Pump Direct Bilge Suctions, No. and size One - 13 1/2" dia Independent Power Pump Direct Suctions to the Engine Room
 Bilges, No. and size One @ 5" included above. 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 or to plate boxes Are they fitted with Valves or Cocks Yes
 Are they fixed sufficiently high on the ship's side to be seen without lifting the stowhold plates Yes Are the Overboard Discharges above or below the deep water line Below
 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 Yes How are they protected Yes
 What pipes pass through the deep tanks (CF Bunkers), Bilge & Ballast Have they been tested as per rule Yes
 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 None Is it fitted with a watertight door Yes

BOILERS, &c.—(Letter for record)

Total Heating Surface of Boilers

8262 ft.

Is Forced Draft fitted *Yes*

No. and Description of Boilers *2-W.T.B. Foster Wheeler D type* Working Pressure *460 lbs/p.*

Is a Report on Main Boilers now forwarded? *Yes*

Is *a Donkey* Boiler fitted? *Yes*

If so, is a report now forwarded? *Yes*

Is the donkey boiler intended to be used for domestic purposes only *No*

Plans. Are approved plans forwarded herewith for Shafting *20-4-42* Main Boilers *16-4-42* Auxiliary Boilers *None* Donkey Boilers *Yes Rpt. 6/4*

Superheaters *16-4-42* General Pumping Arrangements *May. — Ship- 15-10-42 & 23-6-42* Oil Fuel Burning Arrangements *4-1-43 & 29-1-43*

SPARE GEAR.

Has the spare gear required by the Rules been supplied *Yes*

State the principal additional spare gear supplied *See attached lists*

The foregoing is a correct description,

*For Vickers-Armstrongs Ltd
Mitchell*

Manufacturer.

Dates of Survey while building
During progress of work in shops -- 1942 June 2, July 13, 17, Sept. 21, 24, 25, 28, 30, Oct. 7, 9, 29, Nov. 10, 24, Dec. 24, 28, 29
During erection on board vessel --- 1943 Jan. 1, 5, 15, 18, 21, 26, Feb. 3, 10, 11, 16, 18, 19, 22, 24, 26, Mar. 11, 16, 17, 19, 22, 24, 26, 27, 29, 31, Apr. 3, 5, 6, 7, 8, 12, 14
Total No. of visits 125

Dates of Examination of principal parts—Casings *Hpl. Rpt* Rotors *Hpl. Rpt* Blading *Hpl. Rpt* Gearing *Hpl. Rpt*

Wheel shaft *Hpl. Rpt* Thrust shaft *Hpl. Rpt* Intermediate shafts *Hpl. Rpt* Tube shaft *None* Screw shaft *3-4-43*

Propeller *3-4-43* Stern tube *Hpl. Rpt* & *31/3/43* Engine and boiler seatings *6-4-43* Engine holding down bolts *29-6-43*

Completion of fitting sea connections *6-4-43* Completion of pumping arrangements *12-8-43* Boilers fired *7-6-43* Engines tried under steam *25-26/7/43*

Main boiler safety valves adjusted *20-7-43* Thickness of adjusting washers *P. B1 3/8" S. B1 1/4"* Superheater *Port Inboard 17/32" Outboard 17/64"*

Rotor shaft, Material and tensile strength *Steel 34/38 tons/0"* Identification Mark *S 5244 S 4918*

Flexible Coupling, Material and tensile strength *Steel Star 38/45 tons/0"* Sleeve *34/38 tons/0"* Identification Mark *S 5277 S 5273 S 5274 S 5275*

Pinion shaft, Material and tensile strength *Nickel Steel 40 tons/0"* Identification Mark *S 5191 S 5192 S 5199*

1st Reduction Wheel Shaft, Material and tensile strength *Nickel Steel 40 tons/0"* Identification Mark *S 5191 S 5192 S 5199*

Wheel shaft, Material *Steel* Identification Mark *S 5743 W.H.* Thrust shaft, Material *Steel* Identification Mark *S 5361 W.H.*

Intermediate shafts, Material *Steel* Identification Marks *S 5028 W.H. S 4957 B.W.* Tube shaft, Material *None* Identification Marks *✓*

Screw shaft, Material *Steel* Identification Marks *S 5305 W.H.* Steam Pipes, Material *Steel* Test pressure *1290 lbs*

Date of test *26-2-43 to 6-7-43* Is an installation fitted for burning oil fuel *Yes*

Is the flash point of the oil to be used over 150°F. *Yes* Have the requirements of the Rules for the use of oil as fuel been complied with *Yes*

Is the vessel (not being an oil tanker) fitted for carrying oil as cargo *No* 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 *No*

Is this machinery a duplicate of a previous case *No* If so, state name of vessel *✓*

General Remarks (State quality of workmanship, opinions as to class, &c.)

The machinery of this vessel has been constructed & fitted on board under Special Survey in accordance with the approved plans, the Rules & the Specification. The workmanship & materials are good & when finally tried under working conditions it was found satisfactory.

It is eligible, in my opinion, to be classed with the following records & notations.

L.M.C. 8-43; C.L.; 3. Steam turbines D.R. geared to 1. Sc shaft. 1415 N.H.P. 460lb. H.S. 8262 F.D

2-W.T.B. (Spt. 440lb) D.B. 100

The welded gear case has been specially examined on conclusion of trials. The external parts completely & the internal parts as far as practicable.

The amount of Entry Fee ... £ ... : ... : ... When applied for, ... 29 19 43

Special 1/5 ... £ 27 : 1/6 : ... When received, ...

Specification Donkey Boiler Fee ... £ 6 : 5/4 : ...

Travelling Expenses (if any) £ 9 : 1/4 : ... 19

Committee's Minute TUES. 14 SEP 1943

Assigned + L.M.C. 8.43 3D. C.L.

2 W.T.B. 460 lbs (Spt 440 lbs)

2B 105-lbs



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