

BALLAST AND FIRE PUMP

Forward, one 300 G.P.M. vertical duplex piston pump (100# discharge pressure) pump with suction to sea chest and discharge to fire line, also suction from each side of deep tank with direct discharge to deck with hose connection, also connection to bilge pump suction and discharge manifolds with double valves.

Steam ejector to be installed to drain transom tank, steering gear room flat and to discharge overboard.

GENERAL SERVICE SYSTEM

One (1) of the two (2) Fire and Butterworth pumps will be connected to the general service system.

Suction manifold connected to sea, to engine room bilge system and to fire pump inlet manifold.

Discharge to manifold connected to fire main direct, Butterworth salt water heater, also to auxiliary condenser circulating line, salt water service main to distiller, main lubricating oil coolers, evaporator, ice machine, sanitary system, overboard, cofferdam, after peak, and also to fresh water system with double valve protection.

DRINKING WATER SYSTEM

Two (2) horizontal self priming centrifugal 6 G.P.M. approved electric motor driven pumps, located aft.

The pumps to draw from culinary and drinking water tanks and to discharge to scuttle butt, galley and pantry.

Drinking water tanks tested to 20# pressure have a total of about 100 tons, two amidships and one aft in steering engine room provided with suction pipes, manholes, trycocks, etc., as required and to pass requirements of the Public Health Service.

WASH WATER SYSTEM

Two horizontal self priming centrifugal 20 G.P.M. approved electric motor driven pumps, each pump driven by one (1) 2 H.P. motor capacity to deliver 20 G.P.M. at 60# discharge pressure.

Hot water is to be supplied by two water heaters, of approved capacity "Taco" or equal accumulator type, one for accommodations aft and one for amidship house, controlled thermostats to maintain water at 180° F. Heaters insulated and equipped with relief valves, thermometers, etc., for proper operation.

Wash water pumps to draw from after peak and double bottom and discharge to cold water direct and hot water through heaters to all wash basins, showers, tubs and sinks in accommodations. (Galley and pantry sinks to be served by Drinking Water System.)

SANITARY SYSTEM

One approved centrifugal electric pump, 120 G.P.M. against 50# discharge pressure, to draw from sea chest and discharge to salt water service main, sanitary system and to all water closets in both after and midship accommodations. The

pipe on the fore and aft bridges to be insulated together with steam heating line.

SALT WATER SERVICE

One pump duplicate of Sanitary Pump, to draw from sea and serve coolers in Engine Room.

REFRIGERATING PLANT

One 3-ton approved make Freon refrigerating machine driven by a $7\frac{1}{2}$ H.P. 1800 R.P.M. Constant Speed motor. Ice machine to be equipped complete with condenser, necessary supply of Freon 12 and complete outfit as generally supplied for this type of machine. Separate expansion valves for meat and dairy rooms. There will also be installed one scuttle butt in chill room or other approved location of about 85 gal. capacity with outlets and drinking faucets where required. The cold storage boxes to have cooling coils sufficient to maintain 15-20 deg. F. temperature in meat room and 40 deg. F. in chill room. Piping from ice machine to cold storage rooms to be led as direct as possible and insulated with moulded cork covered by rosin sized paper and canvas jackets. For the vegetable room a unit air cooler will be supplied and fitted, direct connected to a small marine type motor. Brackets for spare Freon 12 drum. Cooling water supplied by sanitary set and/or separate ice machine circulating pump.

COMPRESSED AIR SYSTEM

One electric motor driven 2-stage air compressor to handle 52 cu. ft. of free air per minute, 100# discharge pressure air receiver capacity 30 cu. ft. provided with pressure gauge, safety valve, automatic unloader, etc., for ships service.

One motor driven combustion control service air compressor, 20 C.F.M. 100# pressure.

Air receiver to discharge to connection in fire room for boiler tube cleaners and clean out for CO₂ recorder air operated controls and also provided with 1½" galvanized pipe deck line having three outlets in each well deck.

SOIL PIPES

Four inch soil pipes from hoppers branching into 5" mains. Hoppers to be raised about 2" above deck on galvanized cast iron or steel stools into which soil pipe is to be fitted. Discharge valve on sides of ship to be cast steel body, with brass flap valve at ship's side and cast iron brass mounted gate valves fitted with composition plug for cleanout. Drains from bath tubs, showers, lavatories, etc., to be led to scupper pipes. Drains from closets and urinals to be led to soil pipes and vented to deck. Separate soil and lavatory pipes to be installed for hospital.

All drain and scupper outlets fitted with clapper valves at ship's side to governmental requirements.

PLUMBING AND PLUMBING FIXTURES

Plumbing fixtures to be of approved make.

Captain's, Officers', Engineers', Radio Operator's, Steward's, Pilot's, Bosun/Pumpman's Bath Rooms are each to be fitted with a Crane Co.'s C-4875 "B" shower, a wash basin and a water closet. Hospital to be fitted with a bathtub, wash basin and a water closet. Seamen's wash room, etc., to have four showers, four water closets, two wash tubs, a bucket bench and urinal. Engine Department wash room, etc., to have two showers, two water closets, one wash tub, a bucket bench and a urinal. Stewards' Department wash room, etc., to have two showers, two water closets, one wash tub, a bucket bench and a urinal.

One wash basin to be installed in each living room not having a private adjoining bath room, except for Gunners' room which is to have two basins.

There shall be furnished running fresh hot and cold wash water to all wash basins, bath tub and all showers.

EVAPORATING SYSTEM

One evaporator, Davis Engineering Co. or equal having not less than 40 tons per 24 hours capacity when evaporating raw fresh water for boiler make-up feed purposes and 20 tons per 24 hours capacity when evaporating sea water. Instructions for operation of Evaporator to be posted. Evaporator provided with copper tubes arranged for easy removal for cleaning. Approved

brine ejector fitted, also safety valve, float feed control, steam traps, gauges, thermometers, etc.

One Davis Engineering make distiller of not less than 4,800 gal. per 24 hours capacity with discharge to drain collecting tank and to culinary tank. Charcoal filter to be fitted in line to culinary tanks.

Evaporator feed pump to be a horizontal centrifugal motor driven pump with automatic control under all service conditions. The control is to maintain an approximate constant level of water in the evaporator. Boiler blow line to be fitted with an orifice and flow control valve.

HOISTING AND HANDLING GEAR

Handling gear for main machinery consists of a transverse member with trolley carriage carried on rollers on fore and aft girders at each side and full length of engine casing and arranged to handle all parts of main turbo-generator and propulsion motor.

Trolley carriage fitted with a 8-ton chain hoist and all moving parts fitted with braking gear; operating chains accessible from working platform.

Eye beam with trolley and two-ton chain hoist over generator sets. All trolleys to be geared type.

Eye bolts, beam clamps, etc., installed as required for handling all items of auxiliary equipment, also suitable slings, lifting yokes, etc. Fore and aft girder to be provided over 525 K.W. auxiliary turbo-generators.

WORKSHOP TOOLS

One (1) 18" x 102" Centers, 12 ft. Bed, Series "LN" Rahn-Larmon Lathe, having a swing of 24" over the Bedways, with 8 speed geared headstock, Timken Bearing equipped. Lathe arranged for multiple Vee Belt Motor Driven by a 2 H.P. 1200 R.P.M. Constant speed motor. Lathe to be complete with quick change gear, double wall apron, separate feed rod and lead screw, hollow spindle, compound rest, power cross feed, steady rest, follower rest, tool post, chasing stop, large and small face plates, centers, taper spindle sleeve, necessary wrenches, taper attachment, thread chasing dial, 16" four jaw heavy duty iron body independent chuck with reversible jaws, fitted to lathe spindle and the following tools: One (1) straight shank tool holder with bit, one (1) left hand bent shank tool holder with bit, one (1) right hand bent shank tool holder with bit, one (1) straight shank cutting off tool holder with blade, one (1) threading tool holder with cutter, one (1) right hand bent shank cutting off tool holder with blade, one (1) Boring Bar holder with bar and two (2) bits, three (3) lathe Dogs (Standard type) 1", 2" and 3"; twelve (12) additional high speed steel cutter bits.

One improved 21" table back geared upright power drill capable of drilling up to 1 $\frac{3}{4}$ " in diameter, fitted with back gears and power feed, and automatic stop, driven by a 1 H.P. motor.

One 16" high duty extension base shaper with vise, direct connected geared 3 H.P. motor drive through four change Timken bearing twin disc

clutch equipped speed box, complete with wrenches and instantaneous brake.

One (1) Cincinnati Type WG or equal 3 H.P. Ball bearing combination wet and dry electrical floor grinder equipped with two (2) 12" diameter x 2" face x 1 1/4" hole grinding wheels with wheel guards to suit, adjustable tool rest, eye shield, wrenches, etc.

All machine shop tools driven by individual motors set on framing of tools.

Five vise benches with 6" combination machinist's vises. One each for engine room, deck, workshop and for each pump room; vises in pump rooms to take up to 6" pipe.

Metal shelf to be provided in storeroom to take pipes and bar material. The engineers' storeroom is to be complete with metal bins and lockers.

Steel lockers with shelves to hold spare valves, etc., located in pump room.

ENGINE ROOM STORE ROOM

To be built at after end of boiler room, enclosed with expanded steel bulkheads and provided with metal lockers, cupboards, racks, hooks, waste can, bins of the Universal Steel Revolving Type, spaces segregated for paint locker and for boiler water test room with sample cooler and connections.

Additional store room to be located adjacent to engineers' workshop and fitted with lockers, cupboards and racks for tools, spare parts, etc., also pipe rack at outboard side to permit stowage of pipes from workshop.

LUBRICATING OIL TANKS, ETC.

Two 60-gallon and one 80-gallon oil tanks, will be placed in engine room, all with filling pipe from deck, fitted with necessary funnels and branches with valves for filling each tank from deck. To be provided with manholes, padlock faucets, gauges, etc., complete, one waste tank, daily oil service tank and oil trays, etc., to be provided complete. All tanks to have brass name plates. Kerosene tank, 150 gallons, with separate filling line is to be installed in engine room.

PAINTING

Main propulsion motor, main generator set, pumps and auxiliaries, iron piping, boilers, etc., to have three coats of lead and oil paint, the last coat of such color as may be selected. All varnishing, striping, lettering, marking, etc., to be done by builder as directed.

CARGO OIL TANK HEATING SYSTEM

Heating coils of $1\frac{1}{2}$ " extra heavy seamless steel pipe in the ratio of one (1) square foot of heating surface to 125 cu. ft. of tank capacity are to be installed in the center and wing cargo tanks about 7" from the bottom of the tanks. The coils are to run fore and aft between the bottom shell longitudinals in the bays between transverses and bulkheads. The coils inside the tanks are to have welded joints.

Steam is to be taken from the auxiliary steam line in the engine room and is to be run under the fore and aft walkway with $1\frac{1}{2}$ " diameter

branches to each tank. A reducing valve is to be provided in the line in the engine room so that steam pressure to coils may be regulated down to 60 lbs. gauge. The diameter of the steam pipe is to be $3\frac{1}{2}$ " in way of the after tank, 3" amidship and $2\frac{1}{2}$ " in way of the forward tanks. The steam supply to each tank is to be controlled by a screw down non-return valve in each branch line. A valved shore steam connection to take two (2) hose is to be provided amidships in the steam supply line to the tanks. Drain connections are to be provided in the steam line.

The returns are to be led back to the cargo heating coil drain tank through a return line which is to be $1\frac{1}{2}$ " diameter in way of the forward tank, increasing to $2\frac{1}{2}$ " diameter amidship and 3" diameter from the after tanks to the drain inspection tank. Yarway Traps with strainer are to be fitted in the return line at each tank.

CARGO HEATING COIL DRAIN TANK

A cargo heating coil drain tank of 600 gallons capacity is to be installed in the Boiler room at a level above the atmospheric drain tank. A trap with by-pass is to be provided in the drain inlet adjacent to the tank.

The interior of the tank is to be divided into four (4) compartments by means of weirs and a baffle plate, the last compartment is to be filled with a filtering medium. The tank is to be provided with vent, sight glass and light, drain connections, outlet and overflow to atmospheric drain tank, scum pan and outlet for oil.

Tank to be made of steel plates, welded construction suitably stiffened and provided with supporting brackets or clips.

CARGO OIL PIPING

The cargo oil piping in tanks is to be substantially as shown on approved Cargo Piping Plan. It is to include three fore and aft 12" mains with cross connections. One main is to serve forward tanks, one midship and one aft. The suction to each tank are to be 10".

For stripping purposes there is to be provided a 6" suction line with 6" branches led to each tank.

Cargo pump room piping is to be arranged to permit the filling or emptying of any cargo tank through the sea connections.

Eight (8) inch cargo oil hose discharge connections and filling piping is to be provided. Victaulic couplings are to be used in the cargo piping where practicable. These couplings are also to take care of the expansion of the piping. Four spare victaulic couplings are to be supplied for each size of pipe.

TANK VENTING SYSTEM

A 4" vent line will be led from each cargo hatch coaming; each group of three athwartship-located hatches will be connected by these 4" branches to an approved 3-unit pressure vacuum valve manifold with an 8" outlet. This manifold will be fitted at side of walkway. Manifolds in each tank group will be connected to an 8" vent

header which will be carried as 8" riser up the nearest mast. At the upper termination of each 8" riser, there will be fitted an approved flame arrestor. Grating platform provided on each mast at level of flame arrestor for maintenance of flame arrestor. The vent line headers are to be provided with drain valves at their lowest point and risers to pressure gauge at base.

STEAM SMOTHERING SYSTEM

To be of steel pipe, steel fittings and cast steel for bulkhead and deck fittings, connected to 150# steam line with master valve located in engine room hatch with connections fitted to all cargo oil tanks, cofferdams, and fuel tanks, Steam smothering lines to package freight spaces, lamp and paint rooms, bos'n's stores, main pump room, and forward pump room, to be taken from Deck Steam Lines. Main line to run forward under walkway and control led by valve in fiddley hatch, a check valve to be fitted at stop valve in main line, branches from main line to spaces to run close to stanchion of walkway, angle stop valves in each branch near main line as high as possible above deck. All to be in accordance with the U. S. Inspection Law.

CO₂ FIRE EXTINGUISHING SYSTEM

A CO₂ Fire Extinguishing System will be provided for protection of bilge spaces in the main cargo pump room, engine room, boiler room; main and auxiliary control cubicles, main motor and main generator cooling system. All of the cylin-

ders will be grouped and fitted so that the gas will be released, as required, by remote manual control from either of the two (2) control stations.

TANK WASHING SYSTEM

An approved tank cleaning system to be installed complete for all cargo and fuel tanks with all necessary connections and attachments.

Hot water supplied to fire line by an approved salt water heater (#16 B.W.G. tubes), having a capacity to heat 450 G.P.M. from 95° F. to 200° F. by-passes, pressure regulating valves and strainers fitted as required. Steam to heater taken from desuperheated steam line at boiler pressure with thermostatic control reducing valve.

Drains from heater to pass through approved drain cooler (18 B.W.G. tubes) having a capacity for cooling 21,650 lbs. of condensate per hour.

Drains from drain cooler controlled by float to maintain drain level in cooler above top of tubes. Drain to discharge into condensers.

DECK MACHINERY

GENERAL FOR DECK MACHINERY

The steam-driven deck machinery is to be of American Engineering Co. or Hyde Windlass Co. make and is to be designed for handling the loads specified below at a minimum steam pressure of 100 lbs. per square inch at the throttle (saturated steam). Normal operating steam pressure is to be 150 lbs. per square inch.

Engines are to be twin cylinder, and are to be

reversible by means of change valves or links. All gears and pinions are to be of cast or forged steel and are to have machine cut teeth. Gearing is to be enclosed where practicable; otherwise it is to be fitted with guards. Hinged guards, arranged to facilitate examination and repair of reciprocating parts, are to be provided over the connecting rod and crank discs. Interconnecting pipes between steam chests are to be brass and fitted with expansion stuffing boxes.

WINDLASS

One steam-driven, horizontal triple spur-gearred, self contained windlass is to be fitted on fore-castle deck. It is to be capable of hoisting simultaneously both anchors from a depth of 30 fathoms with a chain speed of 30 ft. per minute.

The two cast steel wildcats are to be arranged for individual operation through clutches and friction brakes.

Two gypsy heads without whelps for warping are to be mounted on an intermediate shaft of the windlass, and are to be arranged to permit their operation independent of the wildcats.

Two tongue type chain stoppers are to be provided. An oil-retaining lip is to be provided around the base plate of the windlass.

DECK WINCHES

American Engineering Co. or other approved make, double cylinder, double geared, two speed single drum reversible steam winches with change valve control and friction brake. Winches fitted

with bronze piston rods, valve stems, eccentric straps, packing glands, gland studs and nuts. Bronze bushings fitted to all moving parts except shaft bearings which shall have approved white metal. All moving parts provided with guards and piping between valve chests to be brass. All moving parts on this equipment to be fitted with Alemite fittings.

One $8\frac{1}{4}$ " x 10" at fore mast and one $8\frac{1}{4}$ " x 10" at main mast, each fitted with cast steel outboard pedestal bearings and having $23\frac{1}{2}$ " dia. x 24" long gypsies without whelps on extended shafts.

One $8\frac{1}{4}$ " x 10" at king posts amidships having two 15" dia. x $16\frac{1}{2}$ " long gypsies without whelps.

One 9" x 12" with cast steel outboard pedestal bearings and extended shafts having 24" dia. over whelps x 24" long gypsies located on poop.

Steam and exhaust stop valves fitted to winches, copper pipe drop connections from steam and exhaust lines run close to fore and aft bridge for protection.

STEERING GEAR

The steering gear will be of American Engineering Company make, electric hydraulic type with two pumps, each capable of handling the maximum requirements, and motors in duplicate (one being a stand-by).

All parts of the steering gear to be of ample size for the purpose intended. The main tiller to have a jaw type extension to the hand or emergency steering gear. The hand steering gear to

consist of two (2) auxiliary rams and cylinders mounted aft of the main steerer. The rams to be actuated from the deck above by means of a Hele-Shaw pump (similar to design used on main steerer), operated by hand wheels, through a gear reduction.

The steering gear to be fitted on substantial all welded seating with angle drip pan drained by scuppers all around.

Approved arrangement of rudder stops for hard over positions to be fitted.

Control will be from pilot house, pilot house top, after deck and steering gear compartment.

Pilot house control will be by wheel and hydraulic telemotor.

After deck and steering gear compartment control will be by trick wheel.

The gear will be provided with necessary follow up limit stops, and overload protection.

The steering gear motors will be of sufficient power to meet the requirements of the gear without exceeding 150% of the motor rating at momentary peak loads. The motors, protecting devices, and controls will in general conform to the specifications of Electrical Machinery for the ship.

INSTRUMENTS

The necessary pressure and vacuum gauges, mounted on convenient gauge boards will be provided for main turbo-generator unit, condensers, pumps and various piping systems as required.

Main steam and main condenser vacuum gauges will have 8½" dials, main turbo-generator, auxil-

iary exhaust, feed system and fuel oil system gauges will have 6" dials; all other gauges will have 4½" dials.

Thermometers of the distant reading dial type will be provided for the boiler superheated steam and main turbine steam lines, and where required for convenient observation of important services. Other thermometers with brass scale cases and separable sockets will be provided for the various piping systems as required.

Clocks will be provided for the machinery spaces as required.

CO₂ indicators, smoke indicators, stack pyrometers and draft gauges will be provided for boiler installation.

A salinity indicating system for the condensate and feed piping will be provided.

SPARE PARTS AND TOOLS

Spare parts will be furnished in accordance with the requirements of the American Bureau of Shipping 1941 rules, sections 33 and 35, pages 118 and 143, as applicable to the type of machinery provided.

Tools and special wrenches will be furnished as necessary for proper maintenance and overhaul of equipment.

Spare parts and tools will be suitably stowed.