

PIPING BOLTS AND GASKETS

High Tensile Bolts for temperature of 500° F. and over.

Flexitallic Gaskets or equal for pressures of 300# and over.

Viking Gaskets or equal for low pressures and water service.

Durabla Gaskets or equal for cargo and fuel oil transfer lines, lubricating oil and compressed air lines.

SCHEDULE OF VALVES

System	Size Range	Iron	Material	Ends	Face, In.
Main Steam	All	Cast Steel	Stainless Steel	Flanged 1" and above Screwed 1/2" and below	600
Auxiliary Steam (Boiler Feed)	All	Cast or Forged Steel	Stainless Steel	Flanged 1" and above Screwed 1/2" and below	600
Auxiliary Steam (110 lbs.)	2" and above	Cast Steel	Stainless Steel	Flanged	150
	1 1/2", 1" and below	Bronze Bronze	Bronze Bronze	Flanged Screwed	150 150
Auxiliary Steam (125 lbs. and below)	1 1/2" and above 1 1/4" and below	Cast Steel Bronze	Stainless Steel Bronze	Flanged Flanged or Screwed	150 150
H.P. Bleeder Steam Auxiliary Exhaust	All	Cast Steel	Stainless Steel	Flanged	150
	2" and above 1 1/2" and below	Cast Steel Cast Steel	Stainless Steel Stainless Steel	Flanged Flanged	150 150
Feed Pump Suct.	2" and above	Cast Iron	Bronze	Flanged	125
Condnt. Pump Disch.	1 1/2" and below	Bronze	Bronze	Flanged or Screwed	125
Air Ejector Suctions Condensate Suctions	2" and above 1 1/2", 1" and below	Cast Iron Bronze Bronze	Bronze Bronze Bronze	Flanged Flanged Flanged Screwed	125 125 125

SCHEDULES OF VALVES—(Continued)

Service	Size Range	Body	Mounting	Ends	Pressure, P.S.I.
Feed Discharges	2½" and above	Cast Steel	Stainless Steel	Flanged	600
	2" 1" and below	Cast or Forged Steel	Stainless Steel	Flanged	600
	¾" and below	Forged Steel	Stainless Steel	Screwed	600
Reverse Feed Section	2" and above	Cast Iron Bronze	Bronze	Flanged	125
	1½" and below	Cast Iron	Bronze	Flanged or Screwed	125
Boiler Blows	1" and above	Forged or Cast Steel	Stainless Steel	Flanged	600
	¾" and below	Forged Steel	Stainless Steel	Screwed	600
Lubricating Oil	2" and above	Cast Iron	Bronze	Flanged	125
	1½" and below	Bronze	Bronze	Flanged or Screwed	125
Fuel Oil Section, Filling and Transfer	2" and above	Cast Iron	Bronze	Flanged	125
	1½" and below	Bronze	Bronze	Flanged or Screwed	125
Fuel Oil Service	1" and above	Forged or Cast Steel	Stainless Steel or Monel	Flanged	400
	¾" and below	Forged Steel	Stainless Steel or Monel	Screwed	400
Boatboard Barrens Cargo Oil Sections and Discharges	All	Bronze	Bronze	Screwed	400
		Cast Iron*	Bronze	Flanged	125

* Except for Cargo Oil Pump Room Oil Discharge lines valves which are to be cast steel bolted.

SCHEDULES OF VALVES—(Continued)

Service	Size Range	Material	Mounting	Ends	Page, Cont.
Sea Sections Overboard	All	Cast Steel	Bronze	Flanged	125
Discharges	All	Cast Steel	Bronze	Flanged	125
Sea Water Circulating and Service	2" and above	Cast Iron	Bronze	Flanged	125
	1½" and below	Bronze	Bronze	Flanged or Screwed	125
Bilge	2" and above	Cast Iron	Bronze	Flanged	125
	1½" and below	Bronze	Bronze	Flanged or Screwed	125
Ballast	2" and above	Cast Iron	Bronze	Flanged	125
	1½" and below	Bronze	Bronze	Flanged or Screwed	125
Fire Main	2" and above	Cast Steel or Bronze	Bronze	Flanged	300
	1½" and below	Bronze	Bronze	Flanged or Screwed	300
Sanitary	2½" and above	Cast Iron	Bronze	Flanged	125
	2" and below	Bronze	Bronze	Flanged or Screwed	125
Evaporator Blow Fresh Water (Hot or Cold)	All	Bronze	Bronze	Flanged	125
	All	Bronze	Bronze	Screwed	125

SCHEDULES OF VALVES—(Continued)

System	Size Range	Booms	Monitors	Exts	Press. Emb.
H.P. Drains (150 lbs. and above)	2" and above	Cast Steel	Stainless Steel or Monel	Flanged	600
	1½"-1", Inc.	Cast or Forged Steel	Stainless Steel or Monel	Flanged	600
	¾" and below	Forged Steel	Stainless Steel or Monel	Screwed	600
L.P. Drains (below 150 lbs.)	2" and above	Cast Iron	Bronze	Flanged	125
	1½" and be- low	Bronze	Bronze	Flanged or Screwed	125
Heating System	All	Bronze	Bronze	Flanged or Screwed	125
Refrigerating Plant (Fresh)	All	Bronze	Bronze	Soldered	125
Scoppers	All	Cast Steel Galvanized	Bronze	Flanged	
Cargo Tank Pressure-Vacuum Relief Valves	All	Bronze	Bronze	Victaulic Couplings	2

Salt Water Suctions and Discharges, where there is danger of contamination of Fresh Water thereby, fitted with two valves.

All valves will be fitted with brass label plates.

HEAT INSULATION

Main turbine, auxiliary generator turbines and boiler feed pump turbines to be insulated with $1\frac{1}{2}$ " thickness of sectional superex covered by $2\frac{1}{2}$ " thickness of 85% magnesia and lagged with steel.

Feed water heater, surge tank, Butterworth Heater insulated with $2\frac{1}{2}$ " thickness sectional 85% magnesia and $\frac{1}{2}$ " hard finish.

Fuel oil heaters insulated with 2" thickness of 85% magnesia sections and $\frac{1}{4}$ " hard finish.

Evaporator insulated with $1\frac{1}{2}$ " thickness of sectional 85% magnesia and $\frac{1}{2}$ " hard finish.

Boiler steam drums insulated with two (2) $1\frac{1}{2}$ " thickness layers of 85% sectional magnesia and covered with $\frac{1}{4}$ " thickness hard finish.

Reciprocating pump steam cylinders insulated with suitable thickness of 85% magnesia and lagged with sheet steel.

Main steam piping, also fittings and valves, covered with 1" of high temperature cement and $2\frac{1}{2}$ " thickness of 85% magnesia, each layer wired in place and joints sealed with magnesia cement and covered with resin sized paper and 8 oz. canvas jackets sewed on. Flanges fitted with portable magnesia covering $2\frac{1}{2}$ " thick wired in place.

Auxiliary steam line, auxiliary units other than

those previously specified, exhaust piping, steam heat piping, feed water piping from feed heater to boilers, drains and other steam or hot water piping in walking spaces (including flanges in engine and boiler spaces), insulated with portable magnesia covering, standard thickness, lagged with 8 oz. canvas jackets, $\frac{1}{2}$ " Thorkote where exposed to weather. This includes deck piping where required and all other small piping leading forward.

Uptakes insulated with $1\frac{1}{2}$ " thickness of magnesia block and $\frac{1}{2}$ " of hard finish.

Horizontal runs of water pipe above floor to be insulated and lagged.

Fuel oil service piping from heaters and suction of service piping from Bankers aft insulated with 1" thickness magnesia sections and lagged with sewed canvas except at boiler fronts. Piping at boiler fronts lagged with Asbestos cloth and sewed with Asbestos thread.

Cold fresh and salt water piping, above floor plates, wherever sweating would be objectionable and over all electrical equipment insulated with one layer of $\frac{1}{2}$ " thick hair felt and lagged with sewed canvas.

Refrigerating Plant Freon System insulated with molded or sectional cork covering of thickness to approval of manufacturer of refrigerating equipment and lagged with sewed canvas.

LUBRICATING OIL SYSTEM

The lubricating oil system will consist of two (2) pumps, as listed in Pump Table, two (2) ap-

proved type of coolers, one (1) 300 gallons per hour centrifuge, one (1) centrifuge steam heater, necessary 500 gallon capacity storage tanks, approximately 600 gallon capacity drain tank, two (2) strainers for pump discharges and necessary piping, valves, reliefs and drains. System will be provided with necessary thermometers and deck-filling connection for storage tank.

FUEL OIL SYSTEM

Approved fuel oil system furnished complete in every respect, including Davis Paracoil, or equal, heaters, wire mesh basket type suction and discharge strainers, air chambers, thermometers, gauges, relief valves, etc., and capable of using fuel oil of 2° A.P.I. gravity and 500 seconds Viscosity Furol at 122° F.

Two 7½ H.P. motor driven pumps, each 15 G.P.M. at 325# pressure with 2½" suction and 1½" discharge suitable for use with an approved type of automatic combustion control.

Fuel oil service pumps and suction strainers located in engine room with control apparatus located in boiler room.

Suction and discharge strainers fitted with cutout valves and drains on each side for overhauling. Drip pans fitted under strainers. Pump discharges fitted with extra large air chamber and relief valve, discharging to pump suction.

Each fuel oil heater capable of raising temperature of oil required for full power rating of all boilers from 60 deg. F. to 250 deg. F. Fuel oil temperature regulator to be hand and automatic

controlled. Gauges fitted both at inlet and outlet of discharge strainer, also thermometer at outlet of strainer. Heaters to have by-pass to permit overhauling same. Fuel oil heaters, discharge strainers and valves mounted as single unit with drain pan under unit located in boiler room. Return lines from recirculating line to burners are to be returned to suction of pumps. A copper steam pipe $\frac{1}{2}$ " I.P.S. to be run under fuel oil service suction from bunker manifold to service pump and both pipes lagged together.

After wing bunkers fitted with high and low suctions. All suctions to have flanged extra heavy stop valves at bunker bulkhead operated from deck and at place. High and low after wing bunker suctions arranged so that service pumps can serve boilers or discharge overboard. Fuel oil transfer pumps to draw from after wing bunkers and discharge transfer system overboard.

Bunker heater grids of $1\frac{1}{2}$ " pipe bends to be used in lieu of fittings; Grids to be arranged in sections with welded steel flanges for easy removal; Grids to be fitted as low as possible in all fuel oil tanks.

After wing bunker ratio 1 sq. ft. of heating surface to 80 cu. ft., Bunker space forward 1 sq. ft. to 100 cu. ft. Heater coils fitted at all fuel suction pipes. All heater coils and grids fitted with supply and return valves and traps close to bunker bulkheads, with by-pass and valves so arranged that heat may be cut off from bottom grids while steam is supplied to coils around suctions only.

6" filling connections for fuel oil tanks forward,

and wing bunkers aft, to be fitted with return bend at bottom of tanks. Tee connections with blind flanges at deck so arranged that oil can be loaded from either side.

One 700 G.P.M. 100# discharge pressure approved 14" x 14" x 12" vertical duplex piston steam actuated fuel oil transfer pump is to be fitted forward. Two motor gear driven pumps each of 150 G.P.M. 100# discharge pressure are to be installed in the engine room for discharging oil from wing bunker to wing bunker aft or to fuel oil tanks forward, or ashore, through a separate 6" deck line. Forward Pump Room fuel oil transfer pump to discharge through deck line to after wing bunkers or ashore.

MAIN STEAM LINE

Main steam line from boilers cross connected with stop valves at superheaters to main Turbo-Generator set, Aux. Turbo-Generator Sets and air ejectors and soot blowers.

Pipe bends installed for expansion. High pressure steam piping to be fitted with spring supports properly insulated at pipe. Rolling braces fitted where required, all arranged so line will drain to boilers.

Piping passing through bulkheads, etc., flanges insulated from bulkheads and insulation fitted around bolts.

AUXILIARY STEAM LINES

(Auxiliary steam, Exhaust and Water Lines are not to be led over generators and switch-board.)

Auxiliary steam line from boilers cross connected to desuperheater in main boiler drums. Desuperheated steam line direct from desuperheaters to be provided to each main feed and auxiliary feed pumps with stop check valve in line. Feed pumps to be supplied with desuperheated steam for normal operation. After passing desuperheaters auxiliary steam to have reducing valve with by-pass connected to auxiliary steam line and fitted with safety valve set at 160# with atmospheric escape pipe.

Auxiliary steam through reducing valves to supply steam to fuel oil heaters, whistle, wash down injector, steam smothering lines, turbine gland seals, bunker heating coils, steam heating system heaters, sea chests, evaporator coils, burner tip cleaner, steam pumps in forward and after pump rooms and deck machinery. A shore steam connection arranged so that steam can be supplied to fuel oil heaters, port generator and steam heating system without flooding other auxiliaries. Auxiliary steam to be provided for 2nd stage feed water heater. Shore steam connection to be provided in deck steam line at forecastle head.

A connection provided so that shore steam may be used for either auxiliary generator. Stop check valves to be fitted in shore line. All relief valves to be piped to atmospheric exhaust line. Deck steam shut off valves to be stellite trimmed.

GLAND STEAM EXHAUSTER SYSTEM

The gland leak off steam and air from the main turbine and auxiliary generator turbines to be handled by a gland seal ejector discharging to the main condenser air ejector after condenser. The condensate from the after condenser to drain to the fresh water atmospheric drain collecting tank.

AUXILIARY EXHAUST LINE

Auxiliary exhaust to take exhaust from feed pump, turbines and steam driven pumps in pump room and led to main and auxiliary condensers through a back pressure valve set 11# gauge pressure, also to feed water heater and to atmosphere through relief valve set at 15# gauge pressure.

Deck machinery, after winch and pumps forward to exhaust in deck exhaust line which shall lead aft to engine room exhaust and to auxiliary condenser and main condenser thru a back pressure valve.

Drains from the steam seals and chests of auxiliary turbine generators led to drain tank.

Oil separators to be provided as required in the exhaust lines from deck, pumprooms and Engine room reciprocating pumps.

Make up steam for feed heating, etc., supplied to auxiliary exhaust line through reducing valves.

Auxiliary steam line connected to high pressure turbine bleeder line through pilot type Leslie valves.

Non-return valves fitted at all bleeder connections. Drain of forward pumps and deck machinery returned to deck exhaust line.

DRAIN SYSTEM

Clean drains of sufficient pressure returned to surge tank of deaerating feed heater.

Clean drains at low pressure returned to Drain Collecting Tank.

Contaminated drains led through a drain cooler, cooled by fuel oil, to an inspection tank with filter compartment, thence to drain collecting tank. Inspection tank located adjacent to control platform fitted with sight glasses, vent, drain to bilge with funnel and continuous overflow to drain collecting tank.

Drain collecting tank of 200 gal. capacity located below engine room floor provided with level gauge, vent, drain to bilge with valve and lock, also emergency drain and overflow connected to reserve feed tanks. Drains returned to surge tank with drain tank pump or through float operated valve to steam space of main and auxiliary condensers, float valve provided with hand operated by-pass.

Drain coolers, of approved make to have steel shell with expansion ring, tubes of Admiralty metal expanded into rolled naval bronze tube sheets.

BOILER FEED SYSTEM

The feed system to be of the semi-enclosed type with deaerating feed heater on feed pump suc-

tions and with provisions for complete deaeration of boiler feed under normal conditions. There will be two (2) stages of feed heating and provisions for evaporation of raw fresh water for reserve feed purposes. The Condensate and feed pumps will be as described in the pump table.

In general Main feed system will comprise condensate pumps drawing from main condenser hot well, discharging through air ejector condensers and main drain cooler to direct contact deaerating feed water heater with attached storage tank including vent condenser. Heater and tank to be located high enough above feed pumps to insure efficient operation.

Deaerating feed heater to take steam from auxiliary exhaust line and turbine bleed pipes.

The feed pumps will draw from feed pump suction line from deaerating heater and will discharge through the 2nd stage feed heater to the boiler through the main feed line and boiler feed regulators. The feed heaters will be provided with feed by-passes. The feed discharge temperature to boilers will be about 300° F.

The reciprocating auxiliary feed pump will draw from feed pump suction line, distilled water tank or reserve feed tanks in double bottom.

HEATING SYSTEM

Steam to be taken from auxiliary steam line with reducing valve with by-pass, stop valve, relief valve and gauge. Steam will be supplied to forced ventilation heater for after accommodations and to the Shaw-Perkins type or equal radiators in-

stalled in the amidship accommodations, all toilets, wheelhouse and chart room. Unit type air heaters to be installed in steering gear compartment. Radiators for the wheelhouse and chart room will be of solid brass. Each radiator provided with a thermostatic drain trap.

FIRE SYSTEM

Hose connections to be 50' apart and to have 2½" X.H. Bronze Hose globe valves, outlet to have National Fire Hose Thread, with cap and chain; three reducers to be furnished for 1½" hose.

Two 2-stage horizontal direct motor driven centrifugal pumps Ingersoll-Rand or other approved make. Capacity of each 450 G.P.M. at 125# discharge pressure.

Fire pumps draw from sea chest with portable connection to bilge manifold, also from main condenser overboard discharge and discharge direct to fire line, to the Butterworth salt water heater, and overboard. ¼" pipe connection to be provided on top of pump casing for priming.

Gate valves installed in deck fire line at poop front and midship house and locked open. Fire line to be extended to lower cargo hold with two outlets for tank cleaning machines for fore deep tank.

MACHINERY SPACE BILGE SYSTEM

Two 175 G.P.M. rotary pumps, to discharge against a pressure of 40# per sq. in. directly

driven by 10 H.P. motor through flexible coupling.

Pump to draw from manifold with strainers and suction to dwarf cofferdam, forward engine bilge, port and starboard and aft engine room bilge well and to discharge overboard. Independent suction from after end of bilge well will be installed direct to pump.

BILGE SYSTEM

There are to be three (3) bilge systems, one (1) each located in the forward pump room, main cargo pump room and main machinery compartment. The bilge system in the forward pump room is to be served by the ballast and fire pump in that room; the bilge system in the main cargo pump room is to be served by the reciprocating cargo stripping pump in that compartment, and the bilge system in the main machinery compartment is to be served by the engine room bilge pumps.

The arrangement of valves, strainers, etc., is to be as required by law, including deck control of all valves and pumps for pumping out flooded main and forward pump rooms.

The main circulating pump is to be provided with a bilge suction fitted with a non-return valve. A 2½" valved hose connection is to be provided in the engine room bilge main. Bilge drain piping is to be provided from the boiler flat direct to the engine room bilge pump. Strainers are to be provided at drain connections on boiler flat.