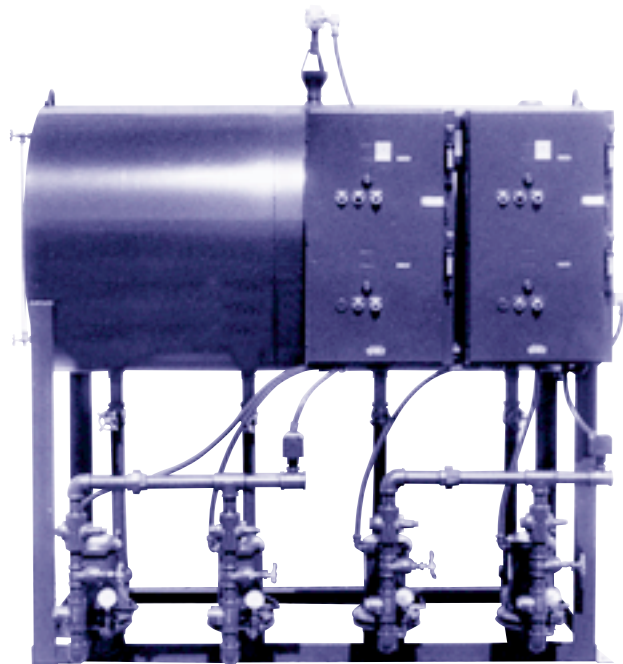


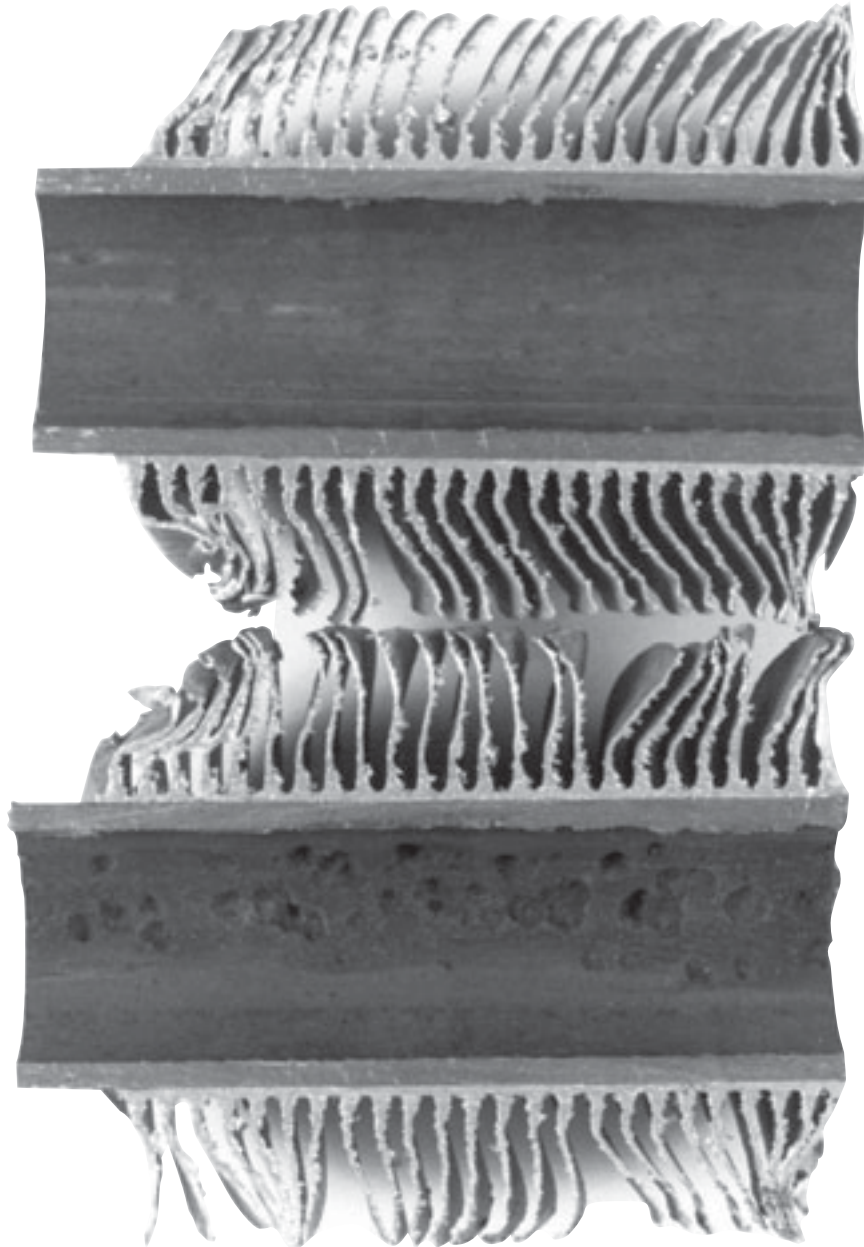
SHIPCO[®]
PUMPS

Revised 7/04



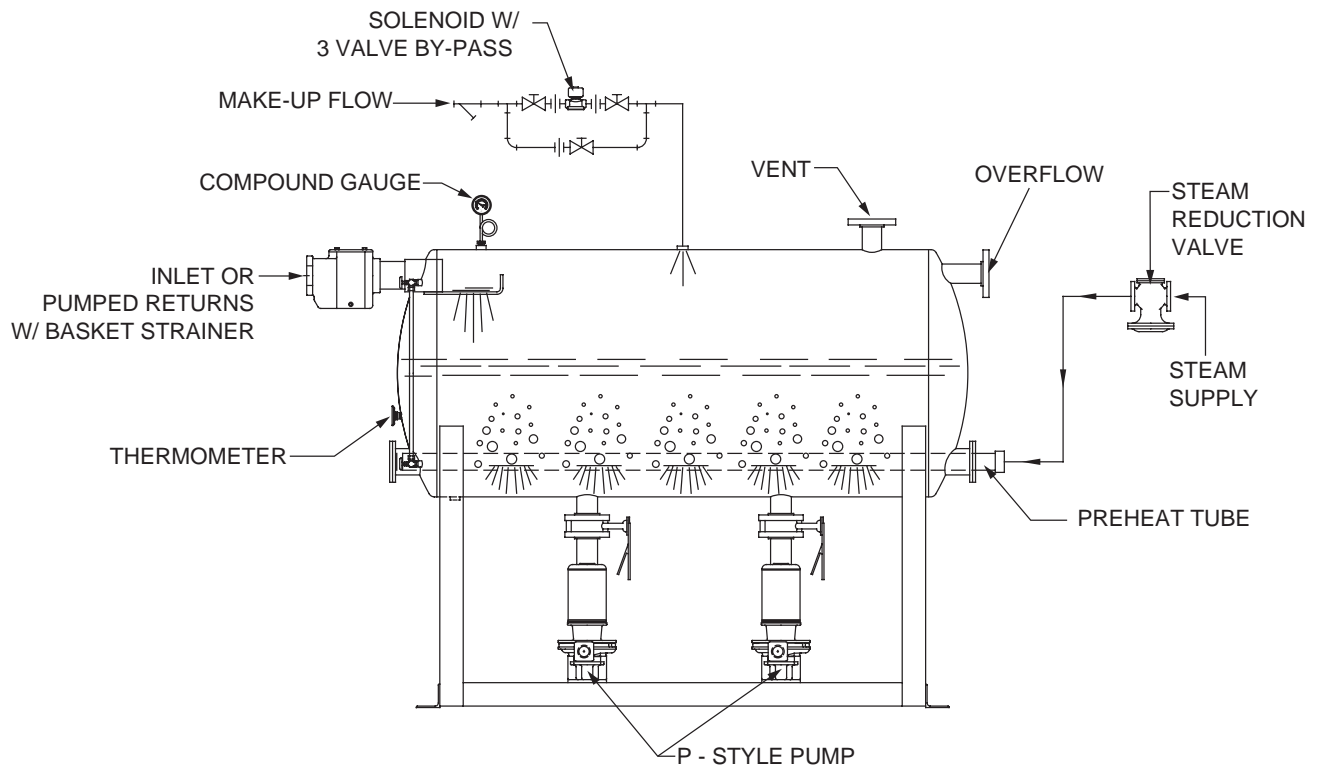
SHIPCO[®] PRE-HEAT UNIT SERIES
PRIDE • QUALITY • CRAFTSMANSHIP

Removal of oxygen and carbon dioxide can help stop destructive and costly corrosion in steam process and steam heating applications. Dissolved oxygen in feed-water is the main cause of corrosion in boilers. Dissolved carbon dioxide is not corrosive; however, the carbonic acid formed in condensate is very corrosive and attacks the equipment and piping. Oxygen and carbon dioxide are not very corrosive under atmospheric conditions, but as heat and pressure increase these gases rapidly become aggressive.



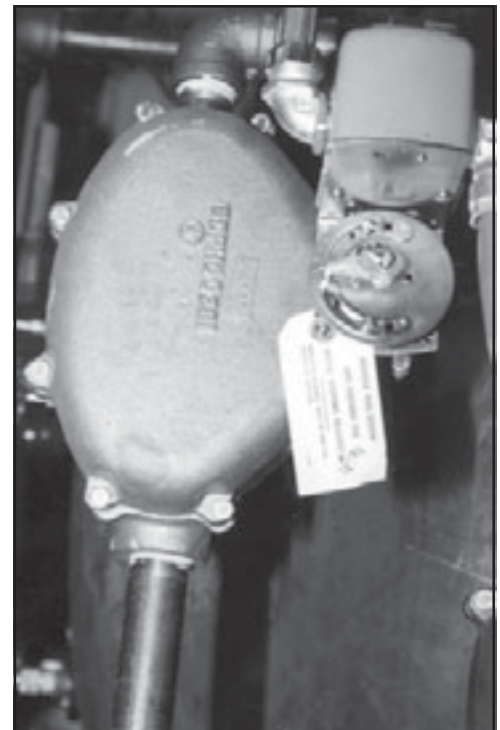
OXYGEN PITTING IS A COSTLY PROBLEM!
PROPER WATER TREATMENT UTILIZING MECHANICAL DEAERATION IS VERY
INEXPENSIVE WHEN COMPARED TO REPLACING EQUIPMENT PREMATURELY!

Mechanical removal is the preferred method of removing these chemicals since you can treat the oxygen chemically, but the carbon dioxide, some carbonates and bicarbonates still remain. A **SHIPCO**[®] Pre-Heat unit should be used when the blend temperature of condensate returns and make-up water is less than 200° F, and economic conditions do not permit use of a .03 or .005 Deaerating unit (Consult Deaerator series information for details).



The **SHIPCO**[®] Pre-Heat unit consists of a boiler feed receiver having an inlet for gravity and/or pumped returns. An optional stainless steel diffuser tube should be utilized for high returns and/or drips can be installed below the water line. A direct injection style heater assembly, sometimes called a preheater tube, made of slotted Stainless Steel Schedule 40 pipe is installed below the water so as to admit steam that is being regulated through a temperature regulator.

Make-up water is admitted through a slow closing solenoid valve and external float switch assembly. This external float switch assembly should be used in lieu of an internal style for make-up, cut-offs and alarms due to turbulence of the steam mixing with the water inside the vessel.



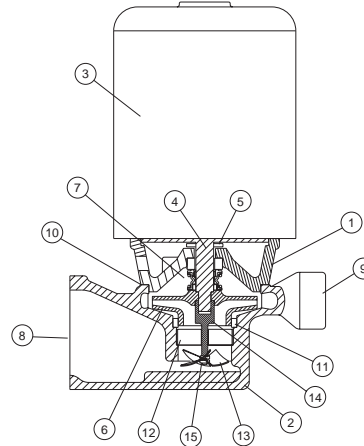
The standard gauge glass assembly provides a quick way of measuring the water level in the receiver.

The standard dial thermometer provides a quick check of the temperature within the tank.

Floor mounted units can be fitted with a suction isolation valve so as to isolate the pump from the receiver when servicing. All elevated units have suction valves as standard in the suction piping where velocities are designed high enough so as to minimize the pressure drop.

Suction strainers are never used with SHIMCO® centrifugal pumps. Strainers are placed in the inlets to the tanks and not in the suction piping. No one can predict the pressure drop through a strainer and once it gets clogged your pump will run dry and destroy itself. Besides, centrifugal pumps can handle some dirt and debris. If you are using turbine pumps it is the lesser of two evils. Turbines have close tolerances and a little dirt will destroy the pump; therefore, suction strainers are used even though they will clog and destroy the motor if they are not kept clean.

The most important component is the Model "P" style 2 Ft. NPSH centrifugal pump. The pump features a bronze fitted pump with bronze impeller, bronze renewable wearing rings, stainless steel axial flow impeller and stainless steel straightening vanes. This pump is designed to handle boiler water and will allow minimal elevation of the receiver. In fact, a floor mounted style SHM or CS unit can handle temperatures up to 210° F at sea level. No need to oversize receivers or elevate the tanks to sky high limits just to obtain the necessary suction head for the pump. Our standard elevated style CES and SHEM units have 30" elevated stands so as to handle 212° F.

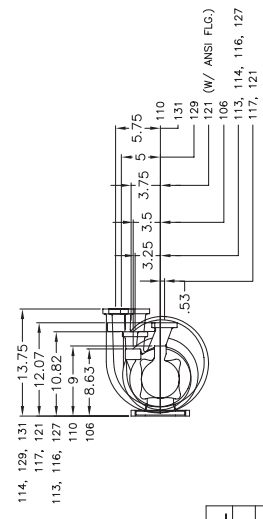
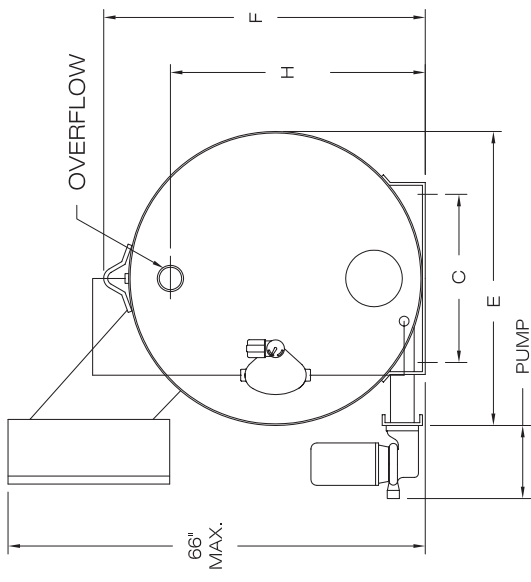
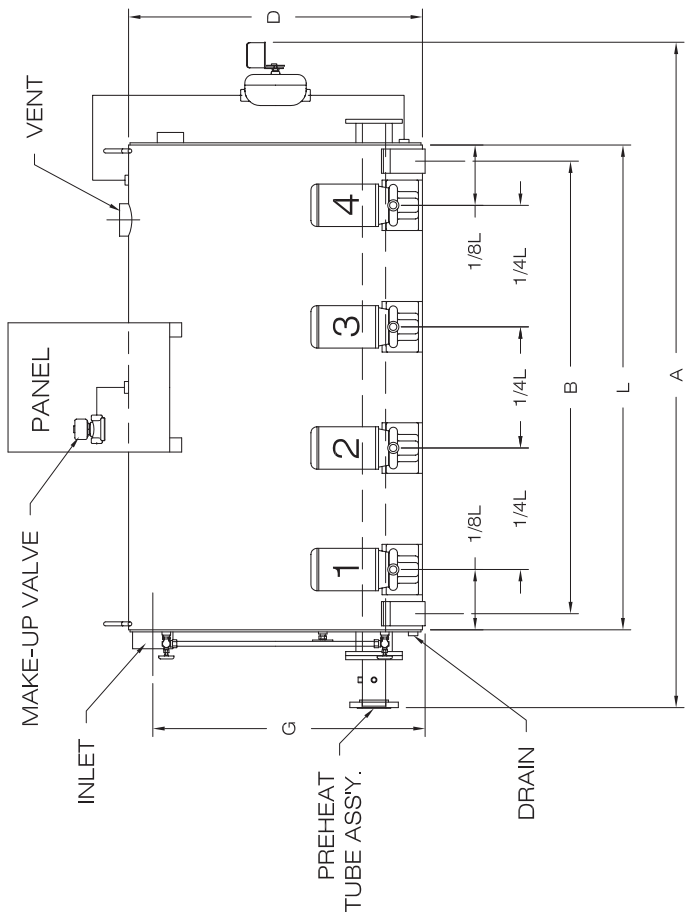


Model P

1. Pump Head
2. Pump Case
3. Motor
4. Motor Shaft
5. Water Slinger
6. Impeller
7. Mechanical Seal
8. Pump Suction
9. Pump Discharge
10. Gasket
11. Case Wearing Ring
12. Straightening Vanes
13. Propeller
14. Propeller Shaft
15. Locking Nut

MODEL P @ 2ft. NPSH or Less to 250° F with Standard Seals

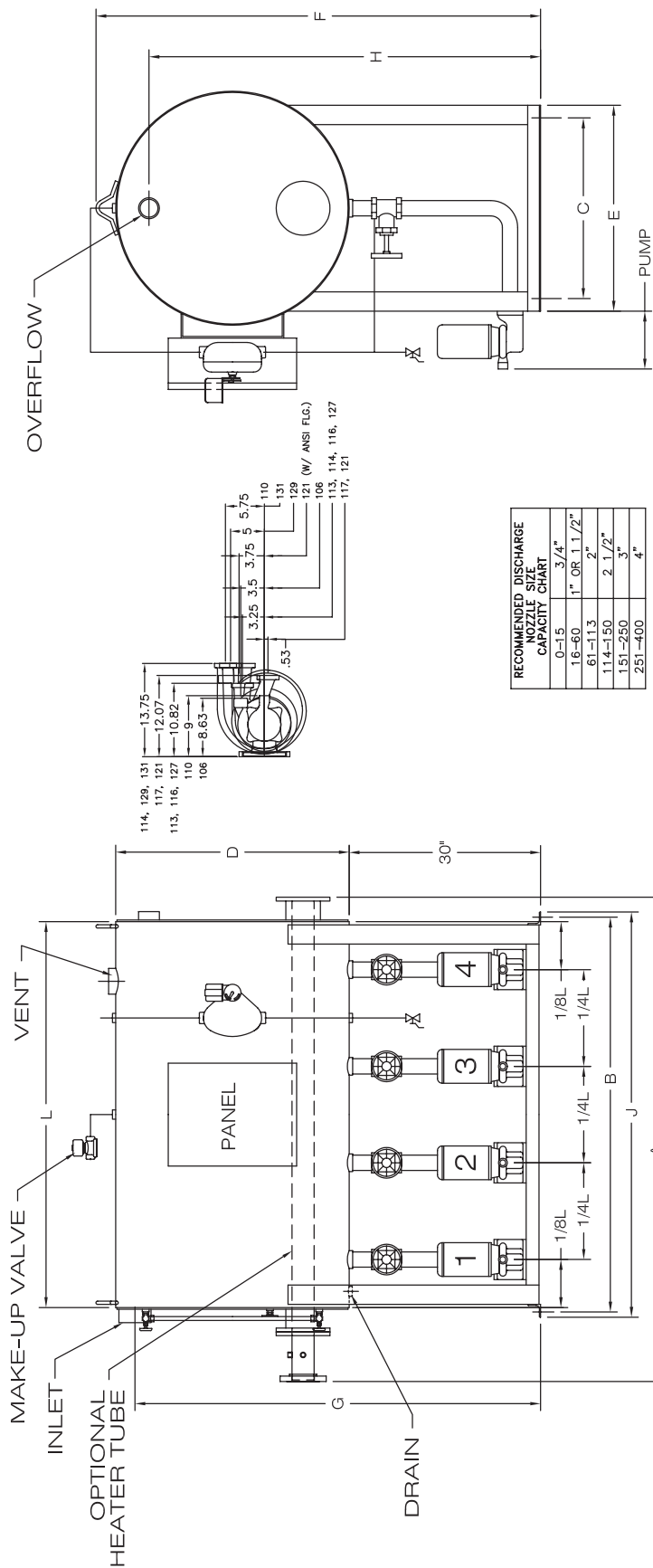
FT.TDH	PSIG	MAXIMUM CAPACITIES AT MOTOR HP (3500 RPM) AND APPLICABLE DISCHARGE PRESSURE																	
369.6	160															50	105	120	GPM
																129	129	129	Pump Type
346.5	150															60	120		GPM
																129	129		Pump Type
323.4	140															15	80	120	GPM
																129	129	129	Pump Type
300.3	130															30	95	120	GPM
																129	129	129	Pump Type
277.2	120															45	110	120	GPM
																129	129	129	Pump Type
254.1	110													25	70	120			GPM
														129	129	129			Pump Type
231.1	100												20	60	87	120			GPM
													121	121	129	129			Pump Type
208	90												30	60	100	120			GPM
													121	121	129	129			Pump Type
184.8	80												37	80	120				GPM
													121	129	129				Pump Type
173.2	75											5	42	85	120				GPM
												121	121	129	129				Pump Type
161.7	70											10	50	92	120				GPM
												121	121	129	129				Pump Type
138.6	60										20	20	66	100	120				GPM
											127	121	129	129	129				Pump Type
115.5	50										12	37	54	87	140				GPM
											117	127	127	129	114				Pump Type
92.4	40										20	28	57	70	105	140			GPM
											113	113	113	113	114	114			Pump Type
69.3	30										8	18	37	48	75	85	140		GPM
											116	116	113	113	113	114	114		Pump Type
57.7	25										16	26	45	60	85	105	140		GPM
											116	116	113	113	113	114	114		Pump Type
46.2	20										10	22	32	55	67	95	122	140	GPM
											110	116	116	113	113	114	114	114	Pump Type
34.6	15										15	28	40	62	76	110	140		GPM
											110	116	116	113	113	114	114		Pump Type
23.1	10										15	34	44	72	87	120	140		GPM
											110	116	116	113	113	114	114		Pump Type
Motor HP		1/3	1/2	3/4	1	1 1/2	2	3	5	7 1/2	10	15	20	25					



D	X	L	GAL.	INLET	OVERFLOW	VENT	DRAIN	MAKEUP	A	B	C	E	F	G	H	1/4 L	1/8 L
18	7/8	x 24	29	2 1/2" CLP.	2" CLP.	2" CLP.	1/2" CLP.	3/4"	36	20 1/2	11 1/2	18 7/8	23	16 5/8	16 3/8	6	3
24	x 36		70	2 1/2" CLP.	2" CLP.	2" CLP.	1/2" CLP.	3/4"	48	32 1/2	14 1/2	24	28	21 3/4	21 1/2	9	4 1/2
24	x 48		94	2 1/2" CLP.	2" CLP.	2" CLP.	1/2" CLP.	3/4"	60	44 1/2	14 1/2	24	28	21 3/4	21 1/2	12	6
24	x 60		117	2 1/2" CLP.	2" CLP.	2" CLP.	3/4" CLP.	3/4"	72	56 1/2	14 1/2	24	28	21 3/4	21 1/2	15	7 1/2
30	x 48		147	3" CLP.	2" CLP.	2" CLP.	3/4" CLP.	3/4"	60	44 1/2	19 1/2	30	34	27 1/2	27	12	6
30	x 60		183	3" CLP.	2" CLP.	2" CLP.	1" CLP.	3/4"	72	56 1/2	19 1/2	30	34	27 1/2	27	15	7 1/2
30	x 72		220	4" CLP.	2" CLP.	2 1/2" CLP.	1" CLP.	3/4"	84	68 1/2	19 1/2	30	34	28 7/8	25 7/8	18	9
36	x 60		264	4" CLP.	2 1/2" CLP.	2 1/2" CLP.	1" CLP.	1"	72	56	23 1/2	36	40	32 7/8	32 7/8	15	7 1/2
36	x 72		317	4" CLP.	2 1/2" CLP.	2 1/2" CLP.	1" CLP.	1"	84	68	23 1/2	36	40	32 7/8	32 7/8	18	9
36	x 84		370	4" CLP.	2 1/2" CLP.	2 1/2" CLP.	1" CLP.	1"	96	80	23 1/2	36	40	32 7/8	32 7/8	21	10 1/2
42	x 72		432	4" CLP.	2 1/2" CLP.	3" CLP.	1" CLP.	1 1/4"	84	68	27 1/2	42	46	38 7/8	38 7/8	18	9
42	x 84		504	4" CLP.	2 1/2" CLP.	3" CLP.	1" CLP.	1 1/4"	96	80	27 1/2	42	46	38 7/8	38 7/8	21	10 1/2
42	x 96		576	4" CLP.	2 1/2" CLP.	3" CLP.	1" CLP.	1 1/2"	108	92	27 1/2	42	46	38 7/8	38 7/8	24	12
48	x 84		658	6" FLG.	2 1/2" CLP.	3" CLP.	1 1/2" CLP.	1 1/2"	96	79	32 1/2	48	52	44 7/16	42 11/16	21	10 1/2
48	x 96		752	6" FLG.	2 1/2" CLP.	3" CLP.	1 1/2" CLP.	1 1/2"	108	91	32 1/2	48	52	44 7/16	42 11/16	24	12
48	x 120		940	6" FLG.	2 1/2" CLP.	3" CLP.	1 1/2" CLP.	2"	132	115	32 1/2	48	52	44 7/16	42 11/16	30	15
54	x 120		1190	6" FLG.	3" CLP.	3" CLP.	1 1/2" CLP.	2"	132	115	36 1/2	54	58	50 7/16	48 15/16	30	15
60	x 120		1468	6" FLG.	3" CLP.	3" CLP.	1 1/2" CLP.	2"	132	114	40 1/2	60	64	56 7/16	54 15/16	30	15

NOTE: WHEN DUPLEX UNIT IS ORDERED CENTER PUMPS ARE USED

PRE-HEAT/CS FLOOR MOUNTED MAKE-UP BOILER FEED UNITS



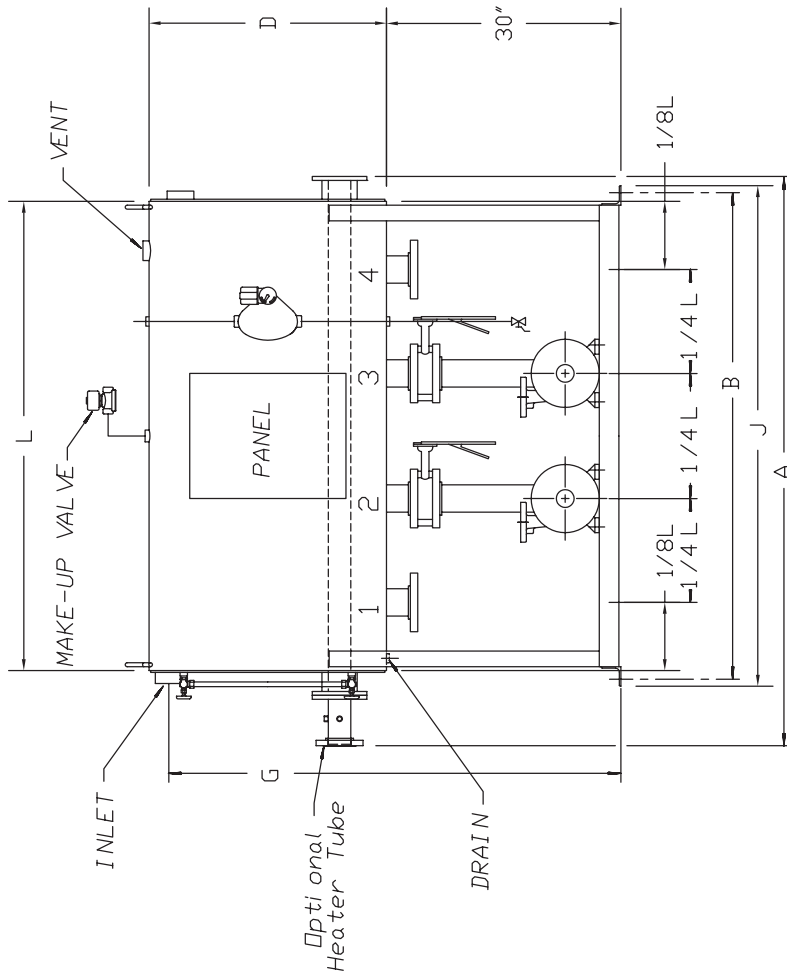
**RECOMMENDED DISCHARGE
PIPE SIZE
CAPACITY CHART**

0-15	3/4"
16-60	1" OR 1 1/2"
61-113	2"
114-150	2 1/2"
151-250	3"
251-400	4"

PRE-HEAT/CES ELEVATED
MAKE-UP BOILER FEED UNITS

D x L	GAL.	INLET	OVERFLOW	VENT	DRAIN	MAKEUP	A	B	C	E	F	G	H	J	1/4 L	1/8 L
18 7/8 x 24	29	2 1/2" CLP.	2" CLP.	2" CLP.	1/2" CLP.	3/4"	46	25 1/2	10 7/8	14 7/8	52 7/8	46 3/8	46 1/8	27	6	3
24 x 36	70	2 1/2" CLP.	2" CLP.	2" CLP.	1/2" CLP.	3/4"	58	37 1/2	16	20	58	51 1/2	51 1/4	39	9	4 1/2
24 x 48	94	2 1/2" CLP.	2" CLP.	2" CLP.	3/4" CLP.	3/4"	70	49 1/2	16	20	58	51 1/2	51 1/4	51	12	6
24 x 60	117	2 1/2" CLP.	2" CLP.	2" CLP.	3/4" CLP.	3/4"	82	61 1/2	16	20	58	51 1/2	51 1/4	63	15	7 1/2
30 x 48	147	3" CLP.	2" CLP.	2" CLP.	3/4" CLP.	3/4"	70	49 1/2	22	26	64	57 1/4	56 3/4	51	12	6
30 x 60	183	3" CLP.	2" CLP.	2" CLP.	3/4" CLP.	3/4"	82	61 1/2	22	26	64	57 1/4	56 3/4	63	15	7 1/2
30 x 72	220	4" CLP.	2" CLP.	2 1/2" CLP.	1" CLP.	3/4"	94	74	22	26	64	56 5/8	55 5/8	76	18	9
36 x 60	284	4" CLP.	2 1/2" CLP.	2 1/2" CLP.	1" CLP.	1"	82	61 1/2	28	32	70	62 5/8	61 7/8	63	15	7 1/2
36 x 72	317	4" CLP.	2 1/2" CLP.	2 1/2" CLP.	1" CLP.	1"	94	74	28	32	70	62 5/8	61 7/8	76	18	9
36 x 84	370	4" CLP.	2 1/2" CLP.	2 1/2" CLP.	1" CLP.	1"	106	86	28	32	70	62 5/8	61 7/8	89	21	10 1/2
42 x 72	432	4" CLP.	2 1/2" CLP.	3" CLP.	1" CLP.	1 1/4"	94	74	34	38	76	68 5/8	67 7/8	76	18	9
42 x 84	504	4" CLP.	2 1/2" CLP.	3" CLP.	1" CLP.	1 1/4"	106	86	34	38	76	68 5/8	67 7/8	89	21	10 1/2
42 x 96	576	4" CLP.	2 1/2" CLP.	3" CLP.	1" CLP.	1 1/2"	118	98 1/2	34	38	76	68 5/8	67 7/8	102	24	12
48 x 84	658	6" FLG.	2 1/2" CLP.	3" CLP.	1 1/2" CLP.	1 1/2"	106	86	39	43	82	74 3/16	72 7/16	89	21	10 1/2
48 x 96	752	6" FLG.	2 1/2" CLP.	3" CLP.	1 1/2" CLP.	1 1/2"	118	98 1/2	39	43	82	74 3/16	72 7/16	102	24	12
48 x 120	940	6" FLG.	2 1/2" CLP.	3" CLP.	1 1/2" CLP.	2"	142	123	39	43	82	74 3/16	72 7/16	127	30	15
54 x 120	1190	6" FLG.	3" CLP.	3" CLP.	1 1/2" CLP.	2"	142	123	45	49	88	80 3/16	78 11/16	127	30	15
60 x 120	1468	6" FLG.	3" CLP.	3" CLP.	1 1/2" CLP.	2"	142	123	51	55	94	86 3/16	84 11/16	127	30	15

NOTE: WHEN DUPLEX UNIT IS ORDERED CENTER PUMPS ARE USED



PUMP CHART	MODEL	LENGTH
	316 AV	24"
	410 AV	25"
	510 AV	27"
	416 AV	27 1/8"
	516 AV	30 1/8"
	221 AV	30 3/4"
	321 AV	34 3/4"

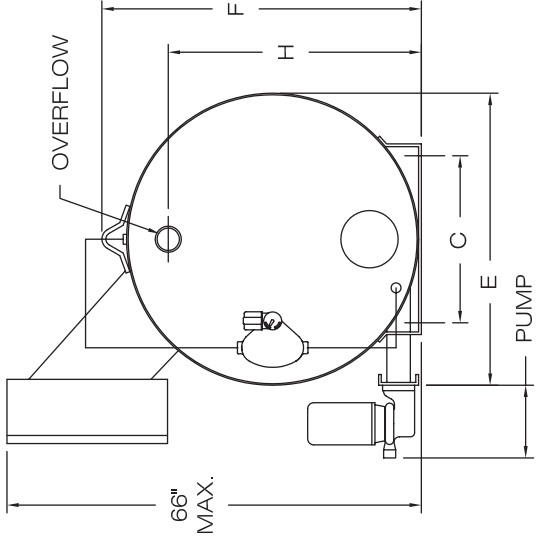
RECOMMENDED DISCHARGE NOZZLE SIZE	CAPACITY CHART
0-15	3/4"
16-60	1" DR 1 1/2"
61-113	2"
114-150	2 1/2"
151-250	3"
251-400	4"

D x L GAL.	INLET	OVERFLOW	VENT	DRAIN	MAKEUP	A	B	C	F	G	H	J	K	1/4	L	1/8	L
24 x 36	2 1/2 CLP	2" CLP	2" CLP	2" CLP	1/2 CLP	3/4	58	37 1/2	6	58	51 1/2	51 1/4	39	2	9	4 1/2	
24 x 48	2 1/2 CLP	2" CLP	2" CLP	2" CLP	1/2 CLP	3/4	70	49 1/2	6	58	51 1/2	51 1/4	51	2	12	6	
24 x 60	2 1/2 CLP	2" CLP	2" CLP	2" CLP	3/4 CLP	3/4	82	61 1/2	6	58	51 1/2	51 1/4	63	2	15	7 1/2	
30 x 48	3" CLP	2" CLP	2" CLP	2" CLP	3/4 CLP	3/4	70	49 1/2	7 1/2	64	57 1/4	56 3/4	51	2	12	6	
30 x 60	3" CLP	2" CLP	2" CLP	2" CLP	1" CLP	3/4	82	61 1/2	7 1/2	64	57 1/4	56 3/4	63	2	15	7 1/2	
30 x 72	4" CLP	2" CLP	2 1/2 CLP	1" CLP	3/4	94	74	7 1/2	64	56 5/8	55 5/8	76	2	18	9		
36 x 60	4" CLP	2 1/2 CLP	2 1/2 CLP	1" CLP	1"	82	61 1/2	9	70	68 5/8	61 7/8	63	2	15	7 1/2		
36 x 72	4" CLP	2 1/2 CLP	2 1/2 CLP	1" CLP	1"	94	74	9	70	68 5/8	61 7/8	76	2	18	9		
36 x 84	4" CLP	2 1/2 CLP	2 1/2 CLP	1" CLP	1"	106	86	9	70	68 5/8	61 7/8	89	2	21	10 1/2		
42 x 72	4" CLP	2 1/2 CLP	2 1/2 CLP	1" CLP	1 1/4	94	74	10 1/2	76	68 5/8	67 7/8	76	2	18	9		
42 x 84	4" CLP	2 1/2 CLP	2 1/2 CLP	1" CLP	1 1/4	106	86	10 1/2	76	68 5/8	67 7/8	89	2	21	10 1/2		
42 x 96	4" CLP	2 1/2 CLP	2 1/2 CLP	1" CLP	1 1/2	118	98 1/2	10 1/2	76	68 5/8	67 7/8	102	2	24	12		
48 x 84	6" FLG	2 1/2 CLP	3" CLP	1 1/2 CLP	1 1/2	106	86	12	82	74 3/16	72 7/16	89	2 1/2	21	10 1/2		
48 x 96	6" FLG	2 1/2 CLP	3" CLP	1 1/2 CLP	1 1/2	118	98 1/2	12	82	74 3/16	72 7/16	102	2 1/2	24	12		
48 x 120	6" FLG	2 1/2 CLP	3" CLP	1 1/2 CLP	2"	142	123	12	82	74 3/16	72 7/16	127	2 1/2	30	15		
54 x 120	6" FLG	3" CLP	3" CLP	1 1/2 CLP	2"	142	123	13 1/2	88	80 3/16	78 11/16	127	2 1/2	30	15		
60 x 120	6" FLG	3" CLP	3" CLP	1 1/2 CLP	2"	142	123	15	94	86 3/16	84 11/16	127	2 1/2	30	15		

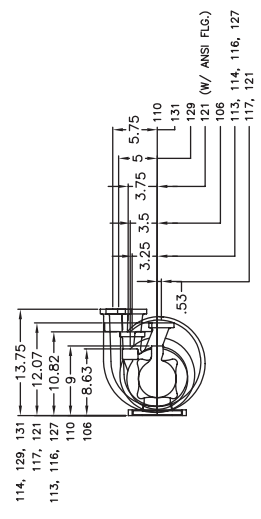
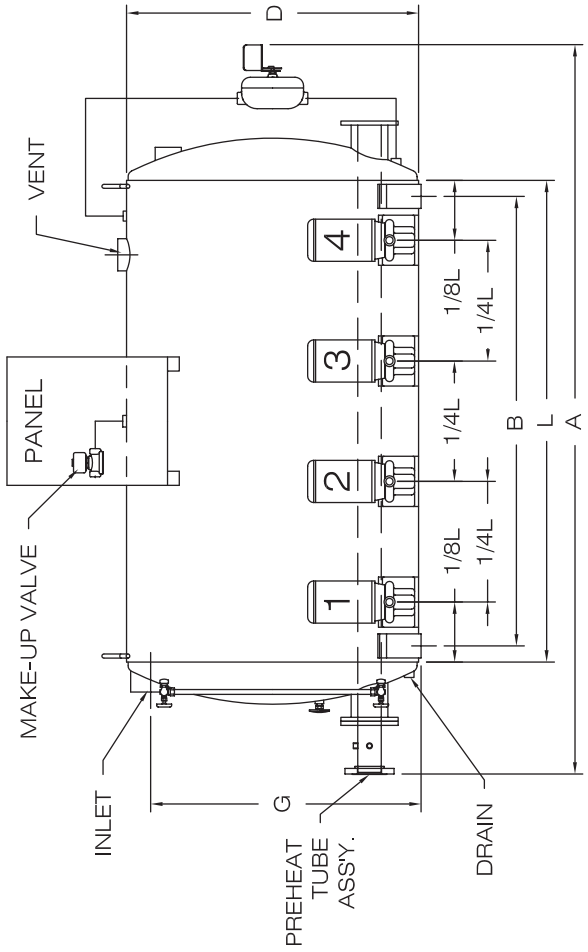
NOTE: UNIT CAN BE MADE DUPLEX ONLY

PRE-HEAT/CES ELEVATED
MAKE-UP BOILER FEED UNITS
WITH AW PUMPS

NOTE: WHEN DUPLEX UNIT IS ORDERED CENTER PUMPS ARE USED



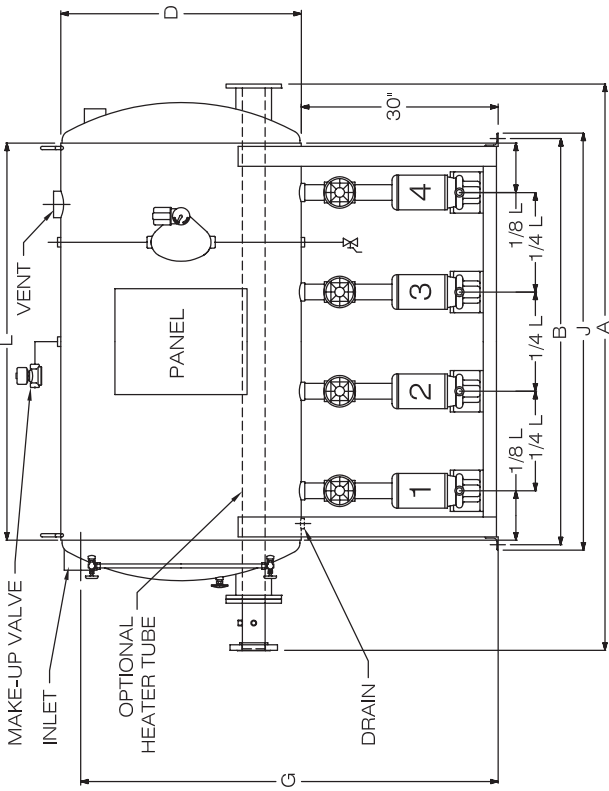
RECOMMENDED DISCHARGE NOZZLE SIZE	CAPACITY CHART
0-15	3/4"
16-60	1" OR 1 1/2"
61-113	2"
114-150	2 1/2"
151-250	3"
251-400	4"



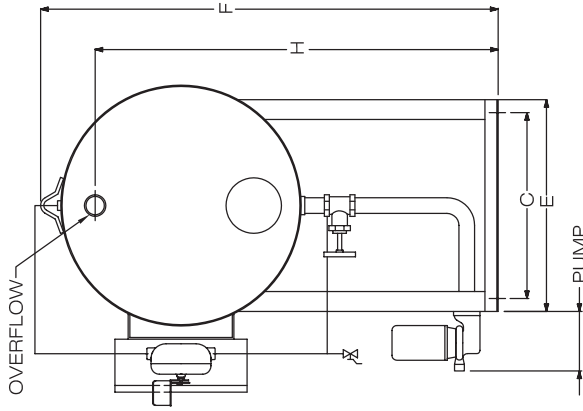
D	X	L	GAL.	INLET	OVERFLOW	VENT	DRAIN	MAKEUP	A	B	C	E	F	G	H	1/4 L	1/8 L
24	x	36	77	2 1/2" CLP.	2" CLP.	2" CLP.	1/2" CLP.	3/4"	55	32 1/2	16 1/2	24	28	22 3/16	21 15/16	9"	4 1/2"
24	x	48	100	2 1/2" CLP.	2" CLP.	2" CLP.	1/2" CLP.	3/4"	67	44 1/2	16 1/2	24	28	22 3/16	21 15/16	12"	6"
24	x	60	124	2 1/2" CLP.	2" CLP.	2" CLP.	3/4" CLP.	3/4"	79	56 1/2	16 1/2	24	28	22 3/16	21 15/16	15"	7 1/2"
30	x	48	162	3" CLP.	2" CLP.	2" CLP.	3/4" CLP.	3/4"	69	44 1/2	22 1/2	30	34	27 13/16	27 5/16	12"	6"
30	x	60	196	3" CLP.	2" CLP.	2" CLP.	1" CLP.	3/4"	81	56 1/2	22 1/2	30	34	27 13/16	27 5/16	15"	7 1/2"
30	x	72	235	4" CLP.	2" CLP.	2 1/2" CLP.	1" CLP.	3/4"	93	68 1/2	22 1/2	30	34	27 5/16	26 5/16	18"	9"
36	x	60	287	4" CLP.	2 1/2" CLP.	2 1/2" CLP.	1" CLP.	1"	83	56	28 1/2	36	40	33 5/16	32 9/16	15"	7 1/2"
36	x	72	344	4" CLP.	2 1/2" CLP.	2 1/2" CLP.	1" CLP.	1"	95	68	28 1/2	36	40	33 5/16	32 9/16	18"	9"
36	x	84	400	4" CLP.	2 1/2" CLP.	2 1/2" CLP.	1" CLP.	1"	107	80	28 1/2	36	40	33 5/16	32 9/16	21"	10 1/2"
42	x	72	472	4" CLP.	2 1/2" CLP.	3" CLP.	1" CLP.	1 1/4"	97	67	34 1/2	42	46	39 5/16	38 9/16	18"	9"
42	x	84	550	4" CLP.	2 1/2" CLP.	3" CLP.	1" CLP.	1 1/4"	109	79	34 1/2	42	46	39 5/16	38 9/16	21"	10 1/2"
42	x	96	576	4" CLP.	2 1/2" CLP.	3" CLP.	1" CLP.	1 1/2"	121	91	34 1/2	42	46	39 5/16	38 9/16	24"	12"
48	x	84	716	6" FLG.	2 1/2" CLP.	3" CLP.	1 1/2" CLP.	1 1/2"	111	79	40 1/2	48	52	44 7/16	42 11/16	21"	10 1/2"
48	x	96	819	6" FLG.	2 1/2" CLP.	3" CLP.	1 1/2" CLP.	1 1/2"	123	91	40 1/2	48	52	44 7/16	42 11/16	24"	12"
48	x	120	1023	6" FLG.	2 1/2" CLP.	3" CLP.	1 1/2" CLP.	2"	147	115	40 1/2	48	52	44 7/16	42 11/16	30"	15"
54	x	120	1270	6" FLG.	3" CLP.	3" CLP.	1 1/2" CLP.	2"	150	115	46 1/2	54	58	50 7/16	48 15/16	30"	15"
60	x	120	1578	6" FLG.	3" CLP.	3" CLP.	1 1/2" CLP.	2"	152	114	52 1/2	60	64	56 7/16	54 15/16	30"	15"
66	x	144	2330	8" FLG.	4" CLP.	4" CLP.	2 1/2" CLP.	2"	176	138	58 1/2	66	70	61 3/8	59 3/8	36"	18"
72	x	120	2365	8" FLG.	4" CLP.	4" CLP.	2 1/2" CLP.	2 1/2"	150	114	64 1/2	72	76	67 3/8	65 3/8	30"	15"
72	x	144	2785	8" FLG.	4" CLP.	4" CLP.	2 1/2" CLP.	2 1/2"	176	138	64 1/2	72	76	67 3/8	65 3/8	36"	18"
72	x	168	3210	8" FLG.	4" CLP.	4" CLP.	2 1/2" CLP.	2 1/2"	200	162	64 1/2	72	76	67 3/8	65 3/8	42"	21"
72	x	192	3630	8" FLG.	4" CLP.	4" CLP.	2 1/2" CLP.	2 1/2"	224	186	64 1/2	72	76	67 3/8	65 3/8	48"	24"
72	x	204	3824	8" CLP.	6" CLP.	6" CLP.	2 1/2" CLP.	2 1/2"	236	198	64 1/2	72	76	67 3/8	66 3/8	51"	25 1/2"
84	x	120	4146	8" CLP.	6" CLP.	6" CLP.	2 1/2" CLP.	2 1/2"	150	114	70 1/2	84	88	73 3/8	72 3/8	30"	15"
84	x	144	4900	8" FLG.	6" CLP.	6" CLP.	2 1/2" CLP.	2 1/2"	176	138	70 1/2	84	88	73 3/8	72 3/8	36"	18"
84	x	168	5650	8" FLG.	6" CLP.	6" CLP.	2 1/2" CLP.	2 1/2"	200	162	70 1/2	84	88	73 3/8	72 3/8	42"	21"

PRE-HEAT/SHM FLOOR MOUNTED MAKE-UP BOILER FEED UNITS

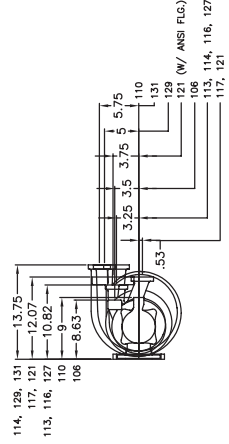
NOTE: WHEN DUPLEX UNIT IS ORDERED CENTER PUMPS ARE USED



RECOMMENDED DISCHARGE NOZZLE SIZE	CAPACITY CHART
0-15	3/4"
16-60	1" OR 1 1/2"
61-113	2"
114-190	2 1/2"
191-250	3"
251-400	4"

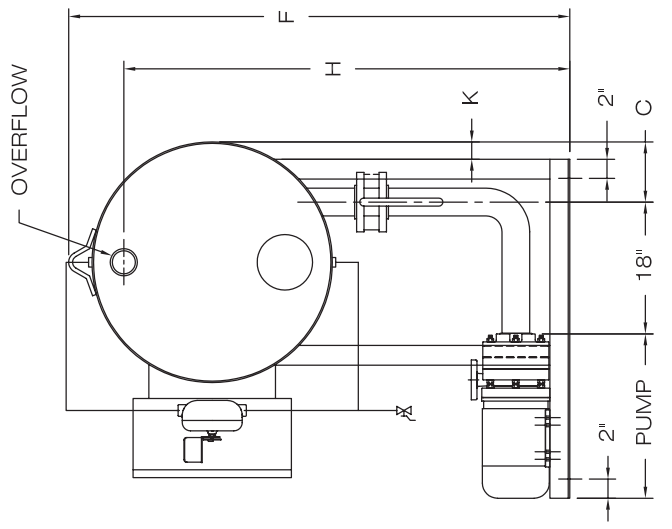


D x L	GAL.	INLET	OVERFLOW	VENT	DRAIN	MAKEUP	A	B	C	E	F	G	H	J	1/4 L	1/8 L
24 x 36	77	2 1/2" CLP.	2" CLP.	2" CLP.	1/2" CLP.	3/4"	65	37 1/2	16	20	58	51 15/16	51 11/16	39	9	4 1/2
24 x 48	100	2 1/2" CLP.	2" CLP.	2" CLP.	1/2" CLP.	3/4"	77	49 1/2	16	20	58	51 15/16	51 11/16	51	12	6
24 x 60	124	2 1/2" CLP.	2" CLP.	2" CLP.	3/4" CLP.	3/4"	89	61 1/2	16	20	58	51 15/16	51 11/16	63	15	7 1/2
30 x 48	162	3" CLP.	2" CLP.	2" CLP.	3/4" CLP.	3/4"	79	49 1/2	22	26	64	57 9/16	57 1/16	51	12	6
30 x 60	196	3" CLP.	2" CLP.	2" CLP.	1" CLP.	3/4"	91	61 1/2	22	26	64	57 9/16	57 1/16	63	15	7 1/2
30 x 72	235	4" CLP.	2" CLP.	2 1/2" CLP.	1" CLP.	3/4"	103	74	22	26	64	57 1/16	56 1/16	76	18	9
36 x 60	287	4" CLP.	2 1/2" CLP.	2 1/2" CLP.	1" CLP.	1"	93	61 1/2	28	32	70	63 1/16	62 5/16	63	15	7 1/2
36 x 72	344	4" CLP.	2 1/2" CLP.	2 1/2" CLP.	1" CLP.	1"	105	74	28	32	70	63 1/16	62 5/16	76	18	9
42 x 72	472	4" CLP.	2 1/2" CLP.	3" CLP.	1" CLP.	1 1/4"	107	74	34	38	76	69 1/16	68 5/16	76	18	9
42 x 84	550	4" CLP.	2 1/2" CLP.	3" CLP.	1" CLP.	1 1/4"	119	86	34	38	76	69 1/16	68 5/16	89	21	10 1/2
42 x 96	576	4" CLP.	2 1/2" CLP.	3" CLP.	1" CLP.	1 1/2"	131	98 1/2	34	38	76	69 1/16	68 5/16	102	24	12
48 x 84	716	6" FLG.	2 1/2" CLP.	3" CLP.	1 1/2" CLP.	1 1/2"	121	86	39	43	82	74 3/16	72 7/16	89	21	10 1/2
48 x 96	819	6" FLG.	2 1/2" CLP.	3" CLP.	1 1/2" CLP.	1 1/2"	133	98 1/2	39	43	82	74 3/16	72 7/16	102	24	12
48 x 120	1023	6" FLG.	2 1/2" CLP.	3" CLP.	1 1/2" CLP.	2"	157	123	39	43	82	74 3/16	72 7/16	127	30	15
54 x 120	1270	6" FLG.	3" CLP.	3" CLP.	1 1/2" CLP.	2"	180	123	45	49	88	80 3/16	78 11/16	127	30	15
60 x 120	1578	6" FLG.	3" CLP.	3" CLP.	1 1/2" CLP.	2"	162	123	51	55	94	86 3/16	84 11/16	127	30	15
60 x 144	1922	6" FLG.	3" CLP.	3" CLP.	2" CLP.	2"	186	147	51	55	94	86 3/16	84 11/16	153	36	18
66 x 144	2330	8" FLG.	4" CLP.	4" CLP.	2 1/2" CLP.	2"	186	146	57	61	100	91 1/8	89 1/8	154	36	18
72 x 120	2385	8" FLG.	4" CLP.	4" CLP.	2 1/2" CLP.	2 1/2"	186	146	63	67	106	97 1/8	95 1/8	130	30	15
72 x 144	2785	8" FLG.	4" CLP.	4" CLP.	2 1/2" CLP.	2 1/2"	210	173	63	67	106	97 1/8	95 1/8	154	36	18
72 x 168	3210	8" FLG.	4" CLP.	4" CLP.	2 1/2" CLP.	2 1/2"	234	197	63	67	106	97 1/8	95 1/8	179	42	21
72 x 192	3630	8" FLG.	4" CLP.	4" CLP.	2 1/2" CLP.	2 1/2"	246	209	63	67	106	97 1/8	95 1/8	203	48	24
72 x 204	3824	8" FLG.	6" CLP.	6" CLP.	2 1/2" CLP.	2 1/2"	160	125	75	79	118	103 1/8	102 1/8	215	51	25 1/2
84 x 120	4148	8" FLG.	6" CLP.	6" CLP.	2 1/2" CLP.	2 1/2"	186	149	75	79	118	103 1/8	102 1/8	131	30	15
84 x 144	4900	8" FLG.	6" CLP.	6" CLP.	2 1/2" CLP.	2 1/2"	210	173	75	79	118	103 1/8	102 1/8	155	36	18
84 x 168	5650	8" FLG.	6" CLP.	6" CLP.	2 1/2" CLP.	2 1/2"	210	173	75	79	118	103 1/8	102 1/8	179	42	21



PRE-HEAT/HEM ELEVATED
MAKE-UP BOILER FEED UNITS

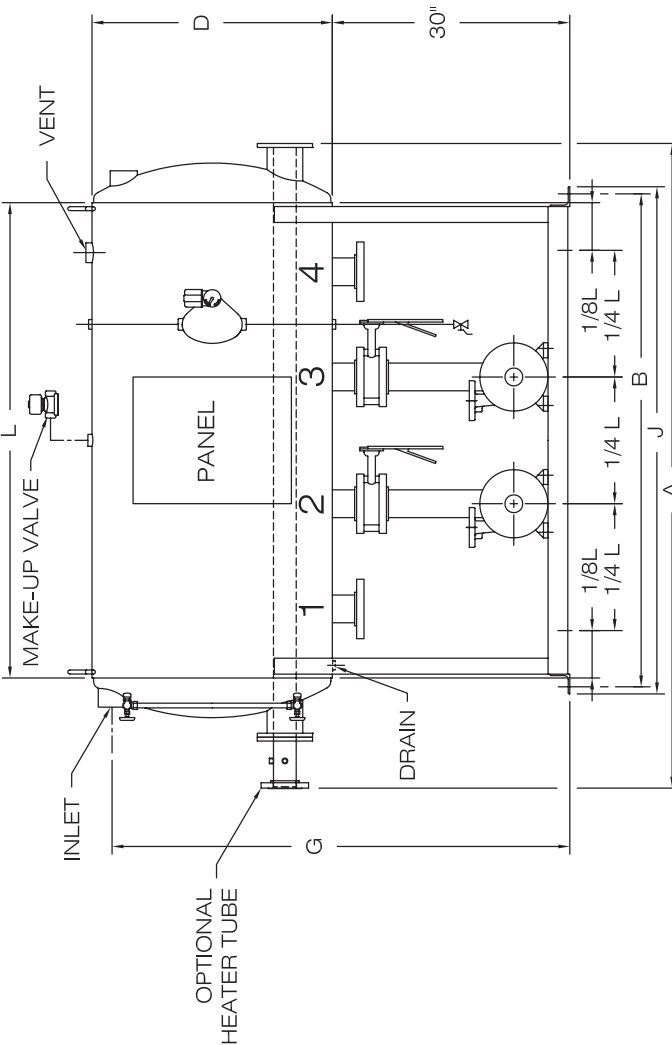
NOTE: WHEN DUPLEX UNIT IS ORDERED CENTER PUMPS ARE USED



MODEL	LENGTH	RECOMMENDED DISCHARGE NOZZLE SIZE CAPACITY CHART
316 AW	24"	0-15
410 AW	25"	16-60
510 AW	27"	61-113
516 AW	30 1/8"	114-150
221 AW	30 3/4"	151-250
321 AW	34 3/4"	251-400

MODEL	LENGTH
316 AW	24"
410 AW	25"
510 AW	27"
516 AW	30 1/8"
221 AW	30 3/4"
321 AW	34 3/4"

NOTE: UNIT CAN BE MADE DUPLEX ONLY



D	x	L	GAL.	INLET	OVERFLOW	VENT	DRAIN	MAKEUP	A	B	C	F	G	H	J	K	1/4	L	1/8
24	x	36	77	2 1/2" C.P.	2" C.P.	2" C.P.	1/2" C.P.	3/4"	65	37 1/2	6	58	51 15/16	51 11/16	39	2	9"	4 1/2"	
24	x	48	100	2 1/2" C.P.	2" C.P.	2" C.P.	1/2" C.P.	3/4"	77	49 1/2	6	58	51 15/16	51 11/16	51	2	12"	6"	
24	x	60	124	2 1/2" C.P.	2" C.P.	2" C.P.	3/4" C.P.	3/4"	89	61 1/2	6	58	51 15/16	51 11/16	63	2	15"	7 1/2"	
30	x	48	162	3" C.P.	2" C.P.	2" C.P.	3/4" C.P.	3/4"	79	49 1/2	7 1/2	64	57 9/16	57 1/16	51	2	12"	6"	
30	x	60	196	3" C.P.	2" C.P.	2" C.P.	3/4" C.P.	3/4"	91	61 1/2	7 1/2	64	57 9/16	57 1/16	63	2	15"	7 1/2"	
30	x	72	235	4" C.P.	2" C.P.	2 1/2" C.P.	1" C.P.	3/4"	103	74	7 1/2	64	57 1/16	56 1/16	76	2	18"	9"	
36	x	60	287	4" C.P.	2 1/2" C.P.	2 1/2" C.P.	1" C.P.	1"	93	61 1/2	9	70	63 1/16	62 5/16	63	2	15"	7 1/2"	
36	x	72	344	4" C.P.	2 1/2" C.P.	2 1/2" C.P.	1" C.P.	1"	105	74	9	70	63 1/16	62 5/16	76	2	18"	9"	
36	x	84	400	4" C.P.	2 1/2" C.P.	2 1/2" C.P.	1" C.P.	1"	117	86	9	70	63 1/16	62 5/16	89	2	21"	10 1/2"	
42	x	72	472	4" C.P.	2 1/2" C.P.	3" C.P.	1" C.P.	1 1/4"	107	74	10 1/2	76	69 1/16	68 5/16	76	2	18"	9"	
42	x	84	550	4" C.P.	2 1/2" C.P.	3" C.P.	1" C.P.	1 1/4"	119	86	10 1/2	76	69 1/16	68 5/16	89	2	21"	10 1/2"	
42	x	96	576	4" C.P.	2 1/2" C.P.	3" C.P.	1" C.P.	1 1/2"	131	98 1/2	10 1/2	76	69 1/16	68 5/16	102	2	24"	12"	
48	x	84	716	6" F.L.G.	2 1/2" C.P.	3" C.P.	1 1/2" C.P.	1 1/2"	121	86	12	82	74 3/16	72 7/16	89	2	21"	10 1/2"	
48	x	96	819	6" F.L.G.	2 1/2" C.P.	3" C.P.	1 1/2" C.P.	1 1/2"	133	98 1/2	12	82	74 3/16	72 7/16	102	2	24"	12"	
48	x	120	1023	6" F.L.G.	3" C.P.	3" C.P.	1 1/2" C.P.	2"	157	123	12	82	74 3/16	72 7/16	127	2	1/2"	30"	
54	x	120	1270	6" F.L.G.	3" C.P.	3" C.P.	1 1/2" C.P.	2"	160	123	13 1/2	85	80 3/16	78 11/16	127	2	1/2"	30"	
60	x	120	1578	6" F.L.G.	3" C.P.	3" C.P.	1 1/2" C.P.	2"	162	123	15	84	86 3/16	84 11/16	127	2	1/2"	30"	
60	x	144	1922	6" F.L.G.	3" C.P.	3" C.P.	2" C.P.	2"	186	147	15	84	86 3/16	84 11/16	133	2	1/2"	36"	
66	x	144	2330	8" F.L.G.	4" C.P.	4" C.P.	2 1/2" C.P.	2"	186	148	16 1/2	100	91 1/8	89 1/8	154	2	1/2"	36"	
72	x	120	2385	8" F.L.G.	4" C.P.	4" C.P.	2 1/2" C.P.	2 1/2"	160	124	18	106	97 1/8	95 1/8	130	2	1/2"	30"	
72	x	144	2785	8" F.L.G.	4" C.P.	4" C.P.	2 1/2" C.P.	2 1/2"	186	148	18	106	97 1/8	95 1/8	154	2	1/2"	36"	
72	x	168	3210	8" F.L.G.	4" C.P.	4" C.P.	2 1/2" C.P.	2 1/2"	210	173	18	106	97 1/8	95 1/8	179	2	1/2"	42"	
72	x	192	3630	8" F.L.G.	4" C.P.	4" C.P.	2 1/2" C.P.	2 1/2"	234	197	18	106	97 1/8	95 1/8	203	2	1/2"	48"	
72	x	204	3824	8" F.L.G.	6" C.P.	6" C.P.	2 1/2" C.P.	2 1/2"	246	209	18	106	97 1/8	96 1/8	215	2	1/2"	25 1/2"	
84	x	120	4168	8" F.L.G.	6" C.P.	6" C.P.	2 1/2" C.P.	2 1/2"	160	125	21	118	103 1/8	102 1/8	131	2	1/2"	30"	
84	x	144	4900	8" F.L.G.	6" C.P.	6" C.P.	2 1/2" C.P.	2 1/2"	186	149	21	118	103 1/8	102 1/8	155	2	1/2"	36"	
84	x	168	5650	8" F.L.G.	6" C.P.	6" C.P.	2 1/2" C.P.	2 1/2"	210	173	21	118	103 1/8	102 1/8	179	2	1/2"	42"	

NOTE: WHEN DUPLEX UNIT IS ORDERED CENTER PUMPS ARE USED

PRE-HEAT/SHEM ELEVATED MAKE-UP BOILER FEED UNITS WITH AW PUMPS

Boiler Feed Sizing

Selection is based on GPM, receiver size, and PSIG.

Determine GPM

The evaporation rate of one boiler horsepower is .069 gallons per minute. Boiler feed pumps are sized at a rate of 1.5 to 2 times this evaporation rate. Boilers are usually rated in boiler horsepower. However, some may be rated in sq. ft. EDR or lbs/hr.

(Conversion Equivalents): One boiler horsepower equals .069 GPM or 33,475 BTU or 34.5 lbs/hr or 139.4 sq. ft. EDR.

Determine Receiver Size

Generally a boiler feed unit should be sized at one gallon gross storage per one system boiler horsepower. This is equivalent to approximately 15 minutes of gross storage. System boiler horsepower is defined as the total possible load of all boilers being fed by the boiler feed unit. For example: Qty (2) 100 HP boilers would have a system load of 200 HP if both boilers ran at one time, for even only a few minutes, because you must size based on the worst case condition.

The selection of the receiver size may vary based on the characteristics of the system. For example, if the piping served by the boiler is in a heating system extending over a considerable area, the amount of time required for the condensate return will be slow. Under such conditions, it is advisable to select a receiver of larger capacity.

If the piping is concentrated in a high office building on a small ground area, experience dictates that the condensate returns quickly, and a smaller receiver size may be chosen. A system with a large percent of make-up (no returns) may accommodate a smaller receiver size.

The main rule of thumb is one gallon gross storage per one system boiler horsepower, or roughly 15 minutes. This is to avoid high quality water going down the drain.

Determine PSIG

Generally low pressure boilers run at .5 to 15 PSIG. Therefore, a discharge pump pressure of 20 PSIG should be adequate. Boiler feed units are usually near the boilers they feed. To be safe you should determine the amount of vertical rise + friction loss in pipe + valve loss + feed valve loss (if any) + back pressure in line (boiler operating pressure) + a safety margin of approximately 5 PSIG. The amount of these values, or these values added together, are normally expressed in feet of head. To convert to pounds per square inch or PSIG, 2.31 feet of head = 1 PSIG.

SUGGESTED BOILER FEED PUMP CAPACITIES
BASED ON SYSTEM LOAD

BOILER HP	EVAPORATION RATE		CONT. PUMP GPM*	ON-OFF PUMP GPM**
	LBS./HR STEAM	GPM		
72	2,500	5	7.5	10
144	5,000	10	15	20
216	7,500	15	22.5	30
290	10,000	20	30	40
434	15,000	30	45	60
580	20,000	40	60	80
720	25,000	50	75	100
868	30,000	60	90	120
1,160	40,000	80	120	160
1,440	50,000	100	150	200
2,160	75,000	150	225	300
2,900	100,000	200	300	400

*for continuously running pumps only.

**recommended capacity based on twice the evaporation rate for intermittently operating pumps.

The blend temperature of the returns plus make-up water is calculated as follows:

$$\% \text{ of Make-up} \times \text{Temperature of Make-up} = N$$

$$\% \text{ of Returns} \times \text{Temperature of Returns} = Y$$

$$(N + Y) = \text{Blend Temperature}$$

Example: Assume 30% make-up at 50° F and 70% returns at 150° F.

$$.30 \times 50 = 15$$

$$.70 \times 150 = 105$$

$$15 + 105 = 120^\circ \text{ F. Blend Temperature}$$

This blend temperature needs to be heated at least 200° F.

A steam temperature regulator controls the admission of steam to maintain this temperature at least 200° F. This temperature regulating valve is sized based on lbs/hr of steam to raise the blend temperature and the steam supply pressure.

$$\frac{\text{load in gallons per minute} \times \text{temperature rise}}{2} = \text{lbs/hr steam required}$$

Example: Assume 100 HP Boiler

Blend temperature of 120° F.

Heating feed water to 200° F.

One boiler horsepower equals .069 gallons per minute

$$100 \text{ BHP} \times .069 \text{ GPM} = 6.9 \text{ load in gallons per minute}$$

$$\frac{6.9 \text{ load GPM} \times (200-120)}{2} = 276 \text{ lbs/hr of steam required}$$