

GENERAL DESCRIPTION

The Sellers atmospheric .03 deaerators condition make-up water and condensate returns to convert them into more desirable boiler feedwater. Heating and atomization are used to remove oxygen and carbon dioxide before the water is pumped to the boiler. Atmospheric deaerators are desirable when high make-up percentages or gravity returns are anticipated.

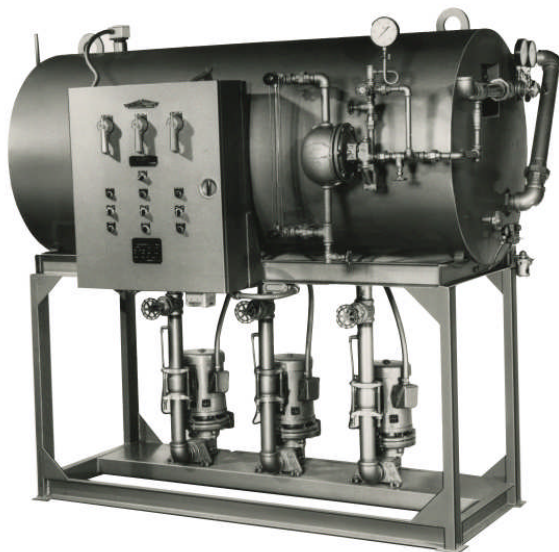
MODEL DESCRIPTION

MODEL .03 SINGLE TANK

The Single tank atmospheric deaerator provides an economical system to preheat boiler feed water and to drive off dissolved gases.

Makeup valves modulate the incoming water from the softener in response to the demands of a float or a level controller. Makeup is mixed with low temperature pumped returns from the system. These are sprayed in thin films and droplets to absorb excess steam and liberate dissolved gases. A steam injector agitates and heats the water to boiling to drive off the oxygen and carbon dioxide. The CO₂ and O₂ gases are removed from the water and purge out the vent with a small amount of waste steam.

Small quantities (up to 5%) of high temperature (over 212° F) gravity returns can be dropped directly into the receiver through the top baffled opening. Larger quantities should be introduced through an optional injector tube. Other low temperature returns should be pumped at 15 psi.



MODEL DK3 SPLIT TANK

The DK3 split tank atmospheric deaerator provides one large receiver with an internal baffle that splits the tank into two sections. Make-up and low temperature returns (gravity or pumped) are brought back to the surge section. High temperature condensate is returned to the deaerator section. This system is very versatile and can be used in most applications that have a blend temperature of less than 180° F. With the split tank design, the need for a separate condensate set to pump back to the deaerator is eliminated because it can accept gravity returns.

A transfer pump is provided to constantly move water from the surge section to the deaerator section for heating. Steam is injected into the deaerator section to heat the water to 211° F. The injector distributes the steam in the tank and agitates the water to provide uniform heating. This agitation and heating drives air and other gases out of the water. Excess water not used by the boiler overflows back to the surge section and pre-heats the make-up and low temperature returns.

An internal vent condenser and spray bar in the surge section condenses the steam. The oxygen and non-condensable gases are vented to atmosphere.

MODEL K5 SPLIT TANK

The K3 model is also available. It operates similar to the DK3, however a pneumatic valve modulates flow from the transfer pump to maintain proper level in the deaerator section. When the water reaches the proper level, the transfer pump is de-energized. This feature can save energy in many applications.

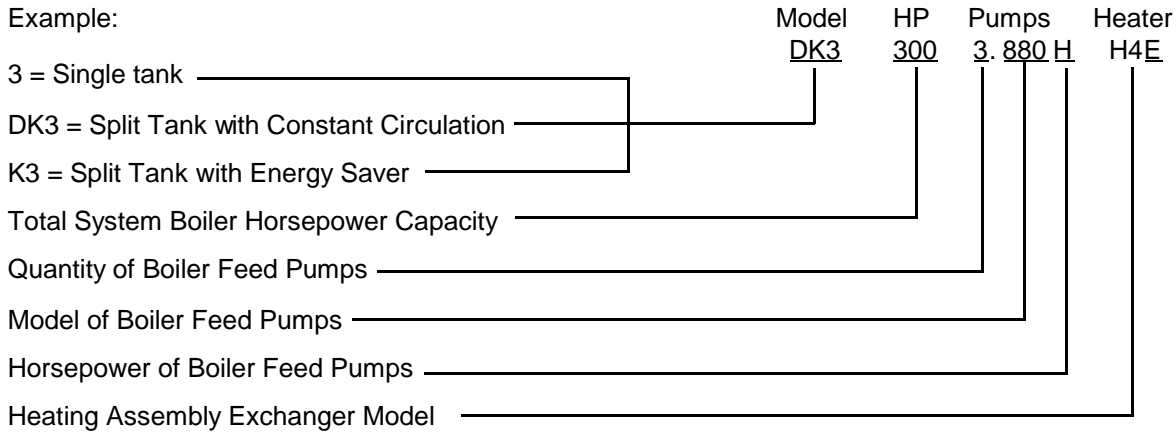
Dimensionally and functionally this system is the same as the DK3 system. The differences being the transfer valve on the K3 system and the constant recirculation on the DK3 system.

.03 DEAERATORS – ATMOSPHERIC

MODEL NUMBER SELECTION

The model number is composed of the base system type and the total boiler horsepower plus the number and type of boiler feed pumps plus the heating assembly model.

Example:



SELECTION INFORMATION

Model types are described on page 1 and on model description sheets.

desired, specify the correct system horsepower and the required tank size.

Horsepower refers to total system boiler capacity. This determines the size of the spray bar, the openings, the overflow, the transfer pump and the standard tank. If larger tanks are

Only boiler feed pump models are shown. The transfer pump for a split system is determined by the system horsepower capacity.

.03 HEATER ASSEMBLY SELECTION

The heater assembly should be sized to take care of the total input load to the system. Make-up water and all low temperature returns require heating. High temperature returns and drips coming back at over 212° degrees F. do not

need to be heated and should be admitted below the water line through an optional diffuser tube. See below for an example of how to size and select the proper heating assembly.

STEP 1

Calculate tank blend temperature and required heat rise based on minimum temperature input.

STEP 2

Select heating assembly based on minimum steam supply pressure and heating requirement.

EXAMPLE

Total load: = 300 HP (10,350 lbs/hr).....20.7 GPM
 Minimum steam supply pressure.....75 psig
 25% make-up at 40° F.....5.18 GPM
 70% L.P. pumped returns at 150° F.....14.5 GPM
 5% returns at 320° F. (heating not required – provide diffuser tube.)

.25 x 40	=	10° F.
.70 x 150	=	<u>105° F.</u>

Blend temperature = 115° F. (sum)

Refer to Selection Chart I, II or III and choose the heating assembly to fit the temperature rise requirement from Step 1. Chart II indicates use of Model H4E heating assembly.

Enter heating assembly model number in the fourth position of the system model number.

Note: For sizing horsepower, return diffusers or heating assemblies not shown on the charts, consult the factory representative.

Required temperature rise = 211° –115° = 96° F.

.03 SINGLE TANK ATMOSPHERIC DEAERATOR

CAPACITIES

Base system model is selected from the following table. The model selected should be suitable for the

total system design horsepower load or total boiler load in pounds of steam per hour.

MODEL NUMBER	POUNDS STEAM PER HOUR	GALLONS PER MINUTE	RECEIVER SIZE (INCHES)	CAPACITY TO OVERFLOW		MAKE-UP VALVE MODEL	SHIPPING WEIGHT* POUNDS
				GALLONS	MINUTES		
3-100	3,450	6.9	30 X 50	130	19	M51S	1,012
3-150	5,175	10.4	30 X 50	130	13	M51S	1,012
3-200	6,900	13.8	30 X 50	130	9	M51S	1,012
3-250	8,625	17.3	30 X 84	219	13	M51S	1,358
3-300	10,350	20.7	30 X 84	219	11	M51S	1,358
3-350	12,075	24.2	30 X 104	272	11	M51S	1,562
3-400	13,800	27.6	36 X 84	328	12	M51S	1,670
3-500	17,250	34.5	42 X 84	456	13	M51S	1,933
3-600	20,700	41.4	42 X 84	456	11	PM3	1,933
3-800	27,600	55.2	42 X 104	566	10	PM3	2,244
3-900	31,050	62.1	42 X 104	566	9	PM3	2,244
3-1000	34,500	69.0	48 X 104	751	11	PM3	2,929
3-1200	41,400	82.8	48 X 120	868	10.0	PM3	3,239
3-1800	62,100	124.2	60 X 120	1,322	11	PM3	4,110
3-2400	82,800	165.6	60 X 120	1,322	.8	PM4	4,963
3-3000	103,500	207.0	66 X 158	2,140	10	PM4	6,494

*Does not include pumps or heating assembly.

STANDARD EQUIPMENT FURNISHED

Receiver: Single tank with handholes or manhole.

Temperature Gauge: Two 3" diameter dial type.

Epoxy Lining: Receiver is sandblasted and lined.

Pressure Gauge: Two 4-1/2" diameter dial type.

Stand: Welded structural steel.

Overflow Trap: Includes syphon breaker.

Make-up Valve: Standard is sized for 25% of capacity.

Drain Valve: Pre-piped to overflow line.

Make-up Controller: Pneumatic on 600 hp and larger.

Steam Valve: Controls temperature and pressure with pneumatic valve.

Bypass: Three valve around make-up valve.

Steam Strainer: Screwed or flanged to match valve.

Vent Condenser: Internal spray tube.

Steam Heater Tube: Stainless Steel

Low Water Alarm: Two probe type to stop pump and sound alarm.

Control Panel: UL Listed assembly.

Spray Bar: Stainless steel spray bar and nozzles.

Factory Assembly: Complete package system ready for connection of utilities.

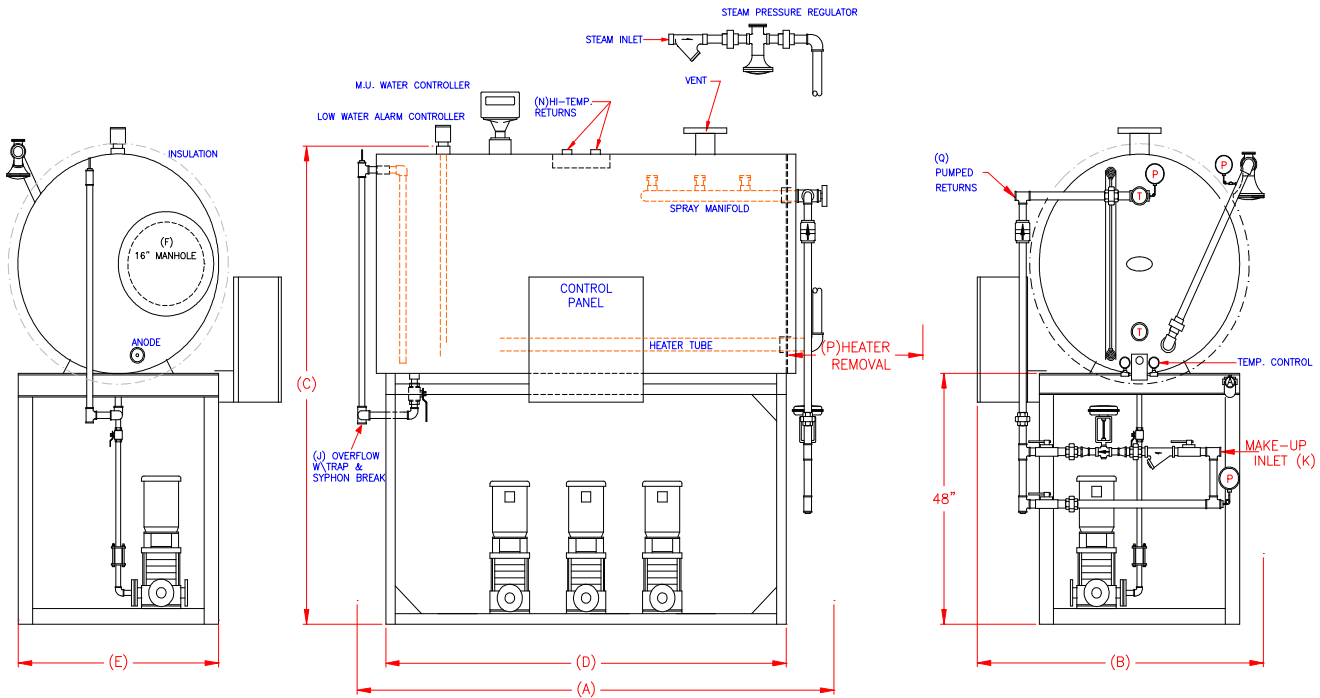
Air Filter Regulator: Maximum 100 psig inlet.

Boiler Feed Pumps: See Pump Bulletin.

Water Gauge Glass: Brass safety type with check.

.03 SINGLE TANK ATMOSPHERIC DEAERATOR

DIMENSIONS



MODEL NUMBER	A	B	C	D	E	F	H	J	K	N	(max) P	Q
3-100	64	50	79	50	30	--	1	1.25	0.75	1.25	28	1.25
3-150	64	50	79	50	30	--	1	1.25	0.75	1.25	46	1.25
3-200	64	50	79	50	30	--	1.25	1.5	0.75	2	60	1.25
3-250	98	50	79	84	30	--	1.25	1.5	0.75	2	60	1.5
3-300	100	50	79	84	30	--	1.25	1.5	0.75	2	60	2
3-350	120	50	79	104	30	--	1.25	1.5	0.75	2	60	2
3-400	100	56	85	84	36	X	1.5	2	0.75	2.5	60	2
3-500	100	62	91	84	42	X	1.5	2	0.75	3	60	2
3-600	100	62	91	84	42	X	1.5	2	1	3	60	2.5
3-800	120	62	91	104	42	X	1.5	2	1	3	60	2.5
3-900	120	62	91	104	42	X	1.5	2	1	3	60	2.5
3-1000	120	75	97*	104	48	X	2	2.5	1	4	60	2.5
3-1200	138	75	97*	120	48	X	2	2.5	1	4	60	3
3-1800	138	85	109*	120	60	X	2.5	3	1	4	60	3
3-2400	143	85	109*	120	60	X	2.5	3	1.5	4	60	3
3-3000	181	85	115*	158	66	X	3	4	1.5	4	60	3

NOTES:

- (1) Overall dimensions could vary depending on options furnished.
- (2) Refer to submittal drawings for system height..
- (3) See submittal drawing for vent line and steam supply sizes.
- (4) Make-up supply line to valve inlet should be a minimum of one pipe size larger than valve.
- (5) Pump orientation is typical. Quantity and type of pumps will determine final orientation.
- (6) Stand height may increase to accommodate pump NPSH.
- (7) Insulation not included in width dimensions.

*Consult factory for over height shipping arrangements.

DK3 (K3) SPLIT TANK ATMOSPHERIC DEAERATOR

CAPACITIES

Base system model is selected from the following table. The model selected should be suitable for the

total system design horsepower load or total boiler load in pounds of steam per hour.

MODEL NUMBER	POUNDS STEAM PER HOUR	GALLONS PER MINUTE	RECEIVER SIZE (INCHES)	CAPACITY TO OVERFLOW**		MAKE-UP VALVE MODEL	SHIPPING WEIGHT* POUNDS
				GALLONS	MINUTES		
DK3-100	3,450	6.9	36 X 50	194	28	M51S	1,710
DK3-150	5,175	10.4	36 X 50	194	19	M51S	1,710
DK3-200	6,900	13.8	36 X 84	326	24	M51S	2,146
DK3-250	8,625	17.3	36 X 84	326	19	M51S	2,146
DK3-300	10,350	20.7	36 X 104	406	20	M51S	2,385
DK3-350	12,075	24.2	36 X 104	406	17	M51S	2,385
DK3-400	13,800	27.6	42 X 104	566	21	M51S	2,706
DK3-500	17,250	34.5	48 X 104	751	22	M51S	3,554
DK3-600	20,700	41.4	48 X 104	751	18	E3	3,554
DK3-800	27,600	55.2	60 X 104	1,145	21	E3	4,409
DK3-900	31,050	62.1	60 X 104	1,145	21	E3	4,409
DK3-1000	34,500	69.0	54 X 140	1,296	19	E3	4,652
DK3-1200	41,400	82.8	60 X 140	1,544	19	E3	5,346
DK3-1800	62,100	124.2	66 X 158	1,744	14	E3	5,798
DK3-2400	82,800	165.6	72 X 189	2,829	17	E4	11,104
DK3-3000	103,500	207.0	72 X 216	3,265	16	E5	12,240

*Does not include pumps or heating assembly. **55% in surge section, 45% in DA section.

STANDARD EQUIPMENT FURNISHED

Receiver: Single tank with handholes or manhole.

Pressure Gauge: Two 4-1/2" diameter dial type.

Epoxy Lining: Receiver is sandblasted and lined.

Overflow Trap: Includes syphon breaker.

Stand: Welded structural steel.

Drain Valve: Prepped to overflow line.

Make-up Valve: Standard is sized for 25% of capacity.

Steam Valve: Controls temperature and pressure with pneumatic valve. Provided with steam strainer.

Make-up Controller: Pneumatic on 600 hp and larger.

Heat Exchanger: Externally mounted to heat make-up and returns to 220° F.

Bypass: Three valve around make-up valve.

Control Panel: UL Listed assembly.

Vent Condenser: Internal type.

Low Water Alarm: Two probe type to stop pump and sound alarm.

Factory Assembly: Complete package system ready for connection of utilities.

Spray Bar: Stainless steel spray bar and nozzles.

Boiler Feed Pumps: See Pump Bulletin.

Water Gauge Glass: Brass safety type with check.

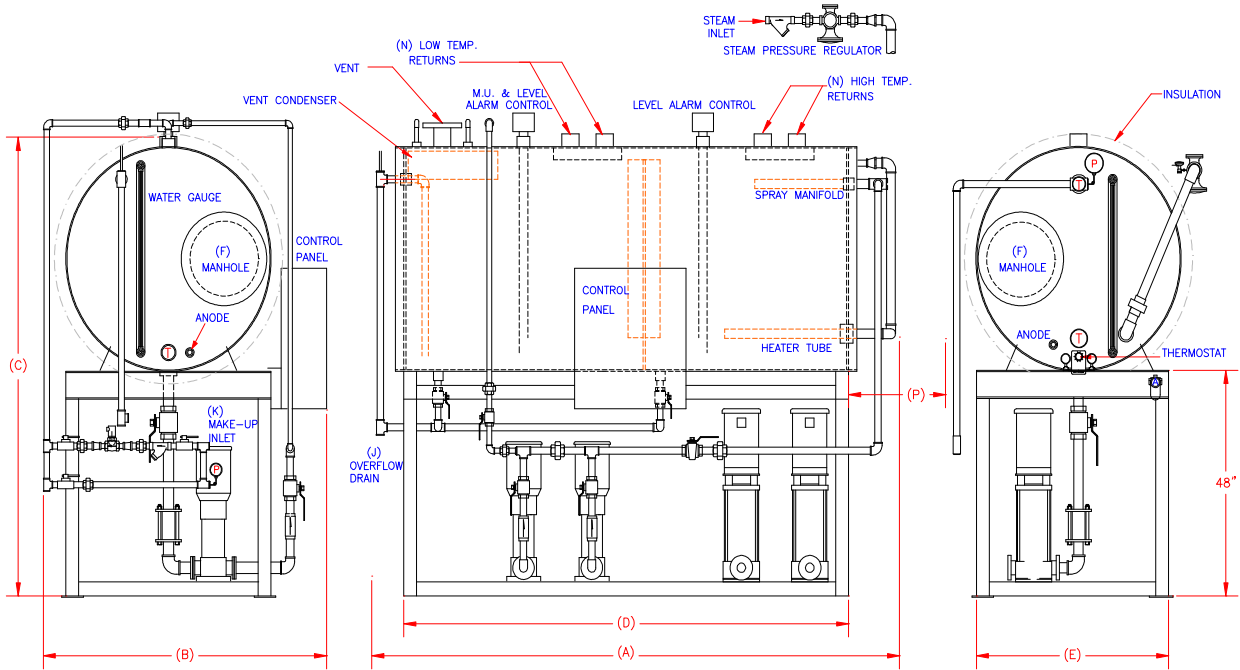
Transfer Pump: Factory mounted, piped and wired.

Temperature Gauge: Two 3" diameter dial type.

Transfer Valve: On K5 systems only.

DK3 & K3 SPLIT TANK ATMOSPHERIC DEAERATOR

DIMENSIONS



MODEL NUMBER	A	B	C	D	E	F	J	K	N	P
DK3-100	64	55	85	50	36	X	1.25	0.75	1.5	50
DK3-150	64	55	85	50	36	X	1.25	0.75	1.5	62
DK3-200	100	55	85	84	36	X	1.5	0.75	2	50
DK3-250	100	56	85	84	36	X	1.5	0.75	2	50
DK3-300	120	56	85	104	36	X	1.5	0.75	2	62
DK3-350	120	56	85	104	36	X	1.5	0.75	2	75
DK3-400	120	56	91	104	42	X	2	0.75	2.5	75
DK3-500	120	73	97*	104	48	X	2	0.75	3	62
DK3-600	120	73	97*	104	48	X	2	0.75	3	75
DK3-800	120	85	109*	104	60	X	2	0.75	3	98
DK3-900	120	85	109*	104	60	X	2	1	3	88
DK3-1000	159	79	103*	140	54	X	2.5	1	3	88
DK3-1200	159	85	109*	140	60	X	2.5	1	3	88
DK3-1800	178	90	109*	158	60	X	2.5	1.25	3	98
DK3-2400	205	105	120*	189	72	X	2.5	1.25	3	98
DK3-3000	232	105	120*	216	72	X	2.5	1.50	3	98

NOTES:

- (1) Overall dimensions could vary depending on options furnished
- (2) Refer to submittal drawings for system height.
- (3) See submittal drawing for vent line and steam supply sizes.
- (4) Make-up supply line to valve inlet should be a minimum of one pipe size larger than valve.
- (5) Pump orientation is typical. Quantity and type of pumps will determine final orientation.
- (6) Stand height may increase to accommodate pump NPSH.
- (7) Same dimensions should be used for the same capacity K3 system.
- (8) Insulation not included in width dimensions.

*Consult factory for over height shipping arrangements.

.03 HEATING ASSEMBLY SELECTION CHARTS

Refer to chart showing applicable temperature rise requirement. Enter chart from left at total boiler horsepower (H.P.) load to be heated and move horizontally to minimum steam supply pressure column that suits job requirements.

Enter this model number into the last position of complete system model number.
For application in shaded areas, consult factory for selections.

SELECTION CHART I

50° F. BLEND TEMPERATURE (161° F. TEMP. RISE)

BOILER HP	MINIMUM STEAM SUPPLY PRESSURE														
	7	9	10	12	15	20	30	50	60	75	100	125	150		
100	L8C	L6C	L5C		HC5		H4C		H3C			H2C			
125	L10D	L6D		L5D		H5D		H4D			H3D		H2D		
150	L8D		L6D		L5D		H6D		H4D			H3D			
200	L10E	L8E		L6E		H8E		H6E		H5E			H4E		
250	L12E	L10E		L8E		H8E		H6E		H5E			H4E		
300	L12F	L10F		L8F		H8F		H6F		H5F			H4F		
350	L16F	L10F		L8F		H10F		H8F		H6F			H5F		
400	L16G	L10G		L8G		H10G		H8G		H6G			H5G		
500	L20G	L12G		L10G		H12G		H10G		H8G			H6G		
600	L16G		L12G		L10G		H12G		H10G		H8G			H6G	
800	L16G		L12G		L10G		H12G		H10G		H8G			H6G	
1000	L16FF		L12FF		L10FF		H16FF		H12FF		H10FF			H8FF	
1200	L20FF		L16GG		L12GG		H20FF		H16GG		H12GG			H10GG	
1800	L20FF		L16GG		L12GG		H20FF		H16GG		H12GG			H10GG	
2400	L20FF		L16GG		L12GG		H20FF		H16GG		H12GG			H10GG	
3000	L20FF		L16GG		L12GG		H20FF		H16GG		H12GG			H10GG	

SELECTION CHART II

100° F. BLEND TEMPERATURE (111° F. TEMP. RISE)

BOILER HP	MINIMUM STEAM SUPPLY PRESSURE														
	7	9	10	12	15	20	30	50	60	75	100	125	150		
100	L6B	L5B		L4B		H4B		H3B			H2B				
125	L8C	L6C		L5C		H5C		H4C		H3C			H2C		
150	L8C	L6C		L5C		H5C		H4C		H3C			H2C		
200	L10D	L6D		L5D		H6D		H5D		H4D			H3D		
250	L10D	L8D		L6D		L5D		H6D		H5D		H4D			
300	L10E	L8E		L6E		H8E		H6E		H5E			H4E		
350	L12E	L10E		L8E		L6E		H8E		H6E		H5E			
400	L12F	L10F		L8F		H8F		H6F		H5F			H4F		
500	L16F	L10F		L8F		H10F		H8F		H6F			H5F		
600	L16G	L12G		L10G		H12G		H10G		H8G			H6G		
800	L20G	L12G		L10G		H12G		H10G		H8G			H6G		
1000	L16FF		L12FF		L10FF		H16FF		H12FF		H10FF			H8FF	
1200	L20GG		L16GG		L12GG		H20GG		H16GG		H12GG			H10GG	
1800	L20GG		L16GG		L12GG		H20GG		H16GG		H12GG			H10GG	
2400	L20GG		L16GG		L12GG		H20GG		H16GG		H12GG			H10GG	
3000	L20GG		L16GG		L12GG		H20GG		H16GG		H12GG			H10GG	

SELECTION CHART II

150° F. BLEND TEMPERATURE (61° F. TEMP. RISE)

BOILER HP	MINIMUM STEAM SUPPLY PRESSURE														
	7	9	10	12	15	20	30	50	60	75	100	125	150		
100	L5A				H3A				H2A						
125	L5B				H4B				H3B						
150	L6B	L5B				H4B				H3B					
200	L6B	L5B				H4B				H3B					
250	L8C	L6C	L5C		H5C		H4C		H3C			H2C			
300	L8D	L6D		L5D		H5D		H4D		H3D			H2D		
350	L10D	L6D		L5D		H6D		H5D		H4D			H3D		
400	L10D	L8D		L6D		L5D		H6D		H5D		H4D			
500	L10E	L8E		L6E		H8E		H6E		H5E			H4E		
600	L12E	L10E	L8E		L6E		H8E		H6E		H5E				
800	L12F	L10F		L8F		H10F		H8F		H6F			H5F		
1000	L16F	L12F	L10F		L8F		H10F		H8F		H6F				
1200	L20EE	L12EE		L10EE		H20EE		H16EE		H12EE			H10EE		
1800	L20FF		L16FF		L12FF		H20FF		H16GG		H12GG			H10GG	
2400	L20GG		L16GG		L12GG		H20GG		H16GG		H12GG			H10GG	
3000	L20GG		L16GG		L12GG		H20GG		H16GG		H12GG			H10GG	

COMPONENT DESCRIPTION

GENERAL DESCRIPTION

The Sellers atmospheric deaerator is an effective boiler feed water system that provides oxygen and carbon dioxide removal to less than .03 cc/liter (42ppb). This system operates at atmospheric pressure and maintains a 212 ° F. boiler feed water temperature. This reduces the use of chemicals and increases boiler life. The standard system provides storage, make-up, heating, pumps and controls all in a packaged system.

RECEIVER

The vented receivers are heavy 1/4" minimum PVQ steel. An epoxy phenolic lining and a magnesium anode are included for extra long service life. Receivers are mounted on a welded structural steel stand with integral pump supports. Receivers 36" diameter and larger are furnished with a 16" diameter manhole. Two or more handholes are provided on smaller tanks. Double handholes or manholes are furnished on split tanks. Top inlet openings are equipped with a baffle.

HEATING ASSEMBLY

Steam is injected below the water line to agitate and heat the water to the boiling point. This action separates the dissolved air from the condensate. A valve to control both steam pressure and water temperature admits the steam through a stainless steel injector assembly. Flow is controlled by a stainless steel trimmed valve and pneumatic thermostat that is responsive to 1/4° F. water temperature.

SPRAY BAR

Make-up water and condensate returns are admitted to the deaerator through nozzles in a stainless steel spray bar. The nozzles break up water allowing faster heating. A spray under the open vent allows faster oxygen removal while condensing excess steam.

CONTROLS

Make-up on small systems to 500 HP is admitted through a MM51 float valve. Larger single tank systems include a pneumatic modulating level controller and valve. Electric solenoid valves and probe type level controls are used on larger split tank units. Standard make-up valves are sized for at least 25% of the unit capacity.

Probe type low water cutoffs are provided on all units to protect the pumps. High water controls are optional.

PUMPS

Pumps are single stage or multistage low NPSH centrifugal type designed for heavy duty industrial service. NEMA C flanged ODP driving motors are direct mounted on the pump. Both stainless steel and bronze fitted pumps are used. Liquid tight wiring to the pumps is standard.

CONTROL PANEL

A unitized control panel for all pumps and controls is furnished. Combination motor starters with circuit breakers and overload protection, oil tight switches and lights, color coded wires and numbered terminal strips are included. The panel assembly complies with NEC requirements and is UL Listed.

DEAERATOR INSTALLATION

Sellers deaerators are factory assembled and ready for installation at the jobsite. All components are factory mounted, set and ready for attachment to building utilities. Delicate controls may be removed and packaged separately for safety in shipping. Over height units are match marked and separated for shipping.

Installation requirements include:

Vent line: Direct to outside, full size with no drips or traps.

Make-up: Fresh softened domestic water to make-up inlet.

Condensate returns: To proper connections per instructions.

Drain valve and overflow: To floor drain.

Pumps: Pipe to boilers and include spring loaded check valve and loading valve.

Steam: Provide clean steam with traps and pipe to inlet strainer.

Chemicals: Inject downstream of pumps unless chemical supplier will guarantee no damage to pumps.

Electrical supply: Provide to single point electrical connection on panel.

Air supply: Provide 30 to 100 psi to air filter regulation inlet connection.

See installation instructions for complete details.