

MODEL FLX

Packaged Watertube Boiler - 5 Pass Steam
1.5 MMBTU/hr - 12.0 MMBTU/hr



Dimensions and Ratings

Figure 1. FLX Steam Dimension Drawing

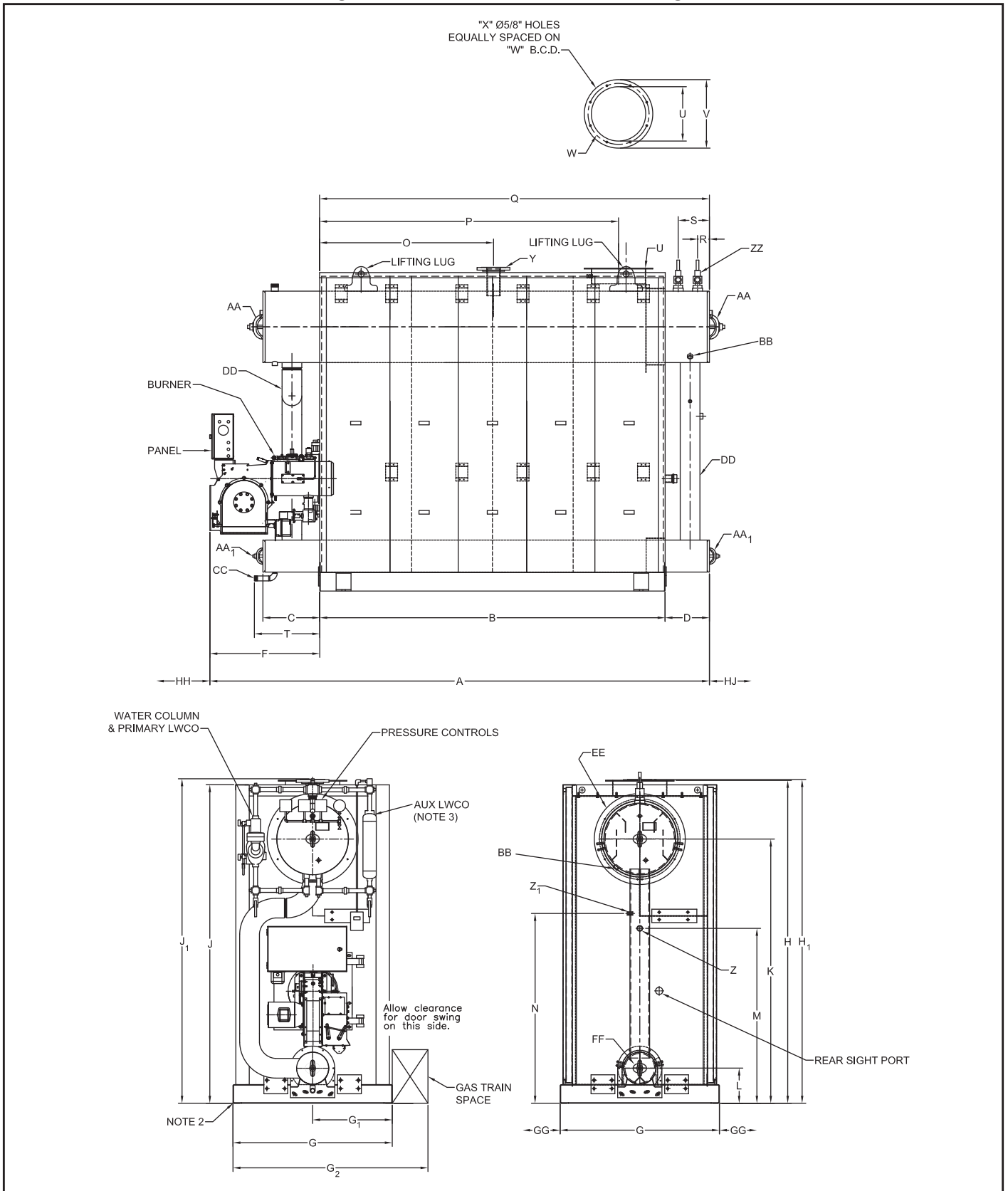


Table 1. FLX Steam Dimensions Sizes 150-500

		BOILER SIZE - NOTE 1							
		150	200	250	300	350	400	450	500
LENGTHS Inches									
Overall	A	108	108	108	114	114	139	139	139
Boiler Base Frame	B	68	68	68	74	74	94	94	94
Front Extension Lower Drum	C	15	15	15	15	15	17	17	17
Rear Extension Lower Drum	D	13	13	13	13	13	13	13	13
Burner Extension	F	27	27	27	27	27	31	31	31
WIDTHS Inches									
Boiler Base Frame [See Note 2]	G	42	42	42	46	46	48	48	48
Centerline to Casing	G₁	41	41	41	23	23	24	24	24
Width to outside of Gas Train	G₂	54	54	54	58	58	60	60	60
HEIGHTS Inches									
Base to Stack Flange	H	86	86	86	90	90	95	95	95
Base to Steam Nozzle	H₁	87	87	87	91	91	95	95	95
Base to Top of Casing	J	85	85	85	89	89	93	93	93
Base to Lifting Lug	J₁	86	86	86	90	90	95	95	95
Base to Upper Drum Centerline	K	69	69	69	73	73	77	77	77
Base to Lower Drum Centerline	L	9	9	9	9	9	10	10	10
Base to Feedwater Connection	M	39	39	39	43	43	47	47	47
Base to Chemical Feed	N	44	44	44	48	48	52	52	52
LOCATIONS Inches									
Front Casing to Steam Nozzle	O	34	34	34	37	37	47	47	47
Flue Outlet Centerline	P	55	55	55	61	61	80	80	80
Front Casing to Upper Drum Rear	Q	81	81	81	87	87	108	108	108
Safety Valves 15 PSIG Setpoint	R	4	4	4	4	4	4	4	4
Safety Valves 15 PSIG Setpoint	S	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Safety Valves 150 PSIG Setpoint	R	4	4	4	4	4	4	4	4
Safety Valves 150 PSIG Setpoint	S	N/A	N/A	N/A	N/A	N/A	9-1/2	9-1/2	9-1/2
Bottom Drain/Blowdown	T	20	20	20	21	21	23	23	23
PIPING CONNECTIONS Inches									
Flue Gas ID	U	10	10	10	12	12	16	16	16
Flue Gas Outlet Flange	V	15	15	15	17	17	21	21	21
Flange Bolt Circle Diameter	W	12-1/2	12-1/2	12-1/2	14-1/2	14-1/2	18-1/2	18-1/2	18-1/2
Number of Bolt Holes	X	4	4	4	4	4	6	6	6
Steam Nozzle 15 PSIG Design Boiler	Y	4 flg.	4 flg.	4 flg.	6 flg.	6 flg.	6 flg.	6 flg.	8 flg.
Steam Nozzle 150 PSIG Design Boiler	Y	2 mpt	2 mpt	2 mpt	2½ mpt	2½ mpt	3 flg.	3 flg.	3 flg.
Feedwater Makeup	Z	1¼	1¼	1¼	1¼	1¼	1¼	1¼	1¼
Chemical Feed	Z₁	½	½	½	½	½	½	½	½
Surface Blowff	BB	1	1	1	1	1	1	1	1
Bottom Drain/Blowdown 15 PSIG Design	CC	1½	1½	1½	1½	1½	2	2	2
Bottom Drain/Blowdown 150 PSIG Design	CC	1¼	1¼	1¼	1¼	1¼	1¼	1¼	1¼
Safety Valves, 15 psig [Note 4]	ZZ	1 @ 2	1 @ 2	1 @ 2	1 @ 2½	1 @ 2½	1 @ 3	1 @ 3	1 @ 3
Safety Valves, 150 psig [Note 4]	ZZ	1 @ 1¼	1 @ 1¼	1 @ 1¼	1 @ 1½	1 @ 1½	2 @ 1¼	2 @ 1¼	2 @ 1¼
GENERAL DATA									
Handhole Upper Drum	AA	4 x 6	4 x 6	4 x 6	4 x 6	4 x 6	4 x 6	4 x 6	4 x 6
Handhole Lower Drum	AA₁	4 x 5	4 x 5	4 x 5	4 x 5	4 x 5	4 x 5	4 x 5	4 x 5
Downcomer OD	DD	4	4	4	4	4	5	5	5
Upper Drum OD	EE	20	20	20	20	20	20	20	20
Lower Drum OD	FF	8-5/8	8-5/8	8-5/8	8-5/8	8-5/8	10-3/4	10-3/4	10-3/4
MINIMUM SERVICE CLEARANCES									
Tube removal each side	GG	28	28	28	32	32	34	34	34
Rear service area	HJ	24	24	24	24	24	24	24	24
Front service area -	HH	36	36	36	36	36	36	36	40

Dimension letters E and I are not used.

NOTES:

1. Multiply Size by 10,000 to obtain BTU/hr input of the boiler.
2. Add 4 inches to each side of the base frame dimension to account for optional seismic anchor pads on each side.
3. For unit sizes beloww 700, the ALWCO [auxiliary low water cutoff] is a probe device in lieu of the column.
4. Connections shown are for valve outlet connection at the standard set point, do not reduce outlet pipe size.

Table 2. FLX Steam Dimensions Sizes 550-1200

		BOILER SIZE - NOTE 1							
		550	600	700	800	900	1000	1100	1200
LENGTHS Inches									
Overall	A	139	145	168	168	168	200	200	205
Boiler Base Frame	B	94	94	116	116	116	140	140	140
Front Extension Lower Drum	C	17	17	17	17	17	19	19	19
Rear Extension Lower Drum	D	13	13	15	15	15	23	23	23
Burner Extension	F	31	37	37	37	37	37	37	43
WIDTHS Inches									
Boiler Base Frame [See Note 2]	G	48	48	54	54	54	54	54	54
Centerline to Casing	G₁	24	24	27	27	27	27	27	27
Width to outside of Gas Train	G₂	60	60	66	66	66	66	66	66
HEIGHTS Inches									
Base to Stack Flange	H	95	95	109	109	109	108.5	108.5	108.5
Base to Steam Nozzle	H₁	95	95	109	109	109	109	109	109
Base to Top of Casing	J	93	93	107	107	107	107	107	107
Base to Lifting Lug	J₁	95	95	109	109	109	109	109	109
Base to Upper Drum Centerline	K	77	77	89	89	89	89	89	89
Base to Lower Drum Centerline	L	10	10	12	12	12	12	12	12
Base to Feedwater Connection	M	47	47	59	59	59	59	59	59
Base to Chemical Feed	N	52	52	64	64	64	64	64	64
LOCATIONS Inches									
Front Casing to Steam Nozzle	O	47	47	58	58	58	58	58	58
Flue Outlet Centerline	P	80	80	100	100	100	124	124	124
Front Casing to Upper Drum Rear	Q	108	108	131	131	131	163	163	163
Safety Valves 15 PSIG Setpoint	R	4	4	4	4	4	4	4	4
Safety Valves 15 PSIG Setpoint	S	N/A	N/A	10-1/2	10-1/2	10-1/2	10-1/2	10-1/2	10-1/2
Safety Valves 150 PSIG Setpoint	R	4	4	4	4	4	4	4	4
Safety Valves 150 PSIG Setpoint	S	9-1/2	9-1/2	10-1/2	10-1/2	10-1/2	10-1/2	10-1/2	10-1/2
Bottom Drain/Blowdown	T	23	23	22	22	22	22	22	22
PIPING CONNECTIONS Inches									
Flue Gas ID	U	16	16	18	18	18	24	24	24
Flue Gas Outlet Flange	V	21	21	23	23	23	29	29	29
Flange Bolt Circle Diameter	W	18-1/2	18-1/2	20-1/2	20-1/2	20-1/2	26-1/2	26-1/2	26-1/2
Number of Bolt Holes	X	6	6	8	8	8	8	8	8
Steam Nozzle 15 PSIG Design Boiler	Y	8 flg.	8 flg.	8 flg.	8 flg.	8 flg.	10 flg.	10 flg.	10 flg.
Steam Nozzle 150 PSIG Design Boiler	Y	3 flg.	3 flg.	4 flg.	4 flg.	4 flg.	6 flg.	6 flg.	6 flg.
Feedwater Makeup	Z	1 1/4	1 1/4	1 1/2	1 1/2	1 1/2	2	2	2
Chemical Feed	Z₁	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
Surface Blowff	BB	1	1	1	1	1	1	1	1
Bottom Drain/Blowdown 15 PSIG Design	CC	2	2	2	2	2	2	2	2
Bottom Drain/Blowdown 150 PSIG	CC	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4
Safety Valves, 15 psig [Note 4]	ZZ	1 @ 3	1 @ 3	2 @ 2 1/2	2 @ 2 1/2	2 @ 2 1/2	2 @ 3	2 @ 3	2 @ 3
Safety Valves, 150 psig [Note 4]	ZZ	2 @ 1 1/4	2 @ 1 1/4	2 @ 1 1/2	2 @ 1 1/2	2 @ 1 1/2	2 @ 2	2 @ 2	2 @ 2
GENERAL DATA									
Handhole Upper Drum	AA	4 x 6	4 x 6	4 x 6	4 x 6	4 x 6	4 x 6	4 x 6	4 x 6
Handhole Lower Drum	AA₁	4 x 5	4 x 5	4 x 5	4 x 5	4 x 5	4 x 5	4 x 5	4 x 5
Downcomer OD	DD	5	5	6	6	6	6	6	6
Upper Drum OD	EE	20	20	24	24	24	24	24	24
Lower Drum OD	FF	10-3/4	10-3/4	10-3/4	10-3/4	10-3/4	10-3/4	10-3/4	10-3/4
MINIMUM SERVICE CLEARANCES									
Tube removal each side	GG	34	34	40	40	40	40	40	40
Rear service area	HJ	24	24	24	24	24	24	24	24
Front service area -	HH	40	40	40	40	40	45	45	45

Dimension letters E and I are not used.

NOTES:

1. Multiply Size by 10,000 to obtain BTU/hr input of the boiler.
2. Add 4 inches to each side of the base frame dimension to account for optional seismic anchor pads on each side.
3. For unit sizes beloww 700, the ALWCO [auxiliary low water cutoff] is a probe device in lieu of the column.
4. Connections shown are for valve outlet connection at the standard set point, do not reduce outlet pipe size.

Table 3. FLX Steam Ratings Sizes 150-550

Boiler SIZE	150	200	250	300	350	400	450	500	550
Ratings [Notes A and B]									
Steam Capacity (lbs. steam/hr from & at 212° F.)	1,242	1,656	2,070	2,484	2,898	3,312	3,726	4,106	4,520
Steam Capacity [kg/hr from and at 100 C]	563	751	939	1,127	1,315	1,502	1,690	1,862	2,050
Output Btu/hr	1,205,100	1,606,800	2,008,500	2,410,200	2,811,900	3,213,600	3,615,300	3,983,525	4,385,225
Output Kcal/Hr	303,696	404,928	506,160	607,392	708,624	809,856	911,088	1,003,884	1,105,116
Output kW	353	471	589	706	824	942	1,060	1,168	1,285
Output Boiler Horsepower	36	48	60	72	84	96	108	119	131
Approximate Fuel Consumption [Input - Note C]									
Natural Gas [ft ³ /hr] - 15 PSI Steam	1,452	1,936	2,435	2,904	3,388	3,872	4,356	4,799	5,283
Natural Gas Therms/Hour - 15 PSI Steam	14.5	19.4	24.3	29.0	33.9	38.7	43.6	48.0	52.8
Natural Gas [m ³ /hr] - 1.03 Bar	41.1	54.8	68.9	82.2	95.9	109.6	123.3	135.9	149.6
Natural Gas [ft ³ /hr] - 150 PSI Steam	1,506	2,009	2,511	3,013	3,515	4,017	4,519	4,979	5,482
Natural Gas Therms/Hour - 150 PSI Steam	15.1	20.1	25.1	30.1	35.1	40.2	45.2	49.8	54.8
Natural Gas [m ³ /hr] - 10.34 Bar	42.7	56.9	71.1	85.3	99.5	113.7	128.0	141.0	155.2
Propane Gas [ft ³ /hr] - 15 PSI Steam	581	774	974	1,162	1,355	1,549	1,742	1,920	2,113
Propane Gas [ft ³ /hr] - 150 PSI Steam	595	793	992	1,190	1,389	1,587	1,785	1,967	2,166
Propane Gas [m ³ /hr] - 1.03 Bar	16.4	21.9	27.6	32.9	38.4	43.9	49.3	54.4	59.8
Propane Gas [m ³ /hr] -10.34 Bar	16.9	22.5	28.1	33.7	39.3	44.9	50.6	55.7	61.3
No.2 Oil Fuel - gph,15 PSI Steam	10.2	13.8	17.3	20.7	24.2	27.7	31.1	34.3	37.7
No.2 Oil Fuel - gph, 150 PSI Steam	10.4	14.2	17.7	21.3	24.8	28.3	31.9	35.1	38.7
No.2 Oil Fuel - liters/hour, 1.03 Bar	38.7	52.3	65.3	78.4	91.5	104.5	117.6	129.6	142.7
No.2 Oil Fuel - liters/hour, 10.34 Bar	39.2	53.6	67.0	80.3	93.7	107.1	120.5	132.8	146.2
Power Requirements - Uncontrolled Emissions [Notes A and D]									
Blower Motor HP - Gas Firing	1/2	3/4	3/4	3/4	1	1	2	2	3
Blower Motor kW - Gas Firing	0.378	0.5595	.5595	.5595	0.746	0.746	1.492	1.492	2.238
Blower Motor HP - Oil or Combination	3/4	1	1	1	1-1/2	1-1/2	2	3	3
Blower Motor kW - Oil or Combination	.5595	0.746	0.746	0.746	1.119	1.119	1.492	2.238	2.238
Oil Pump for Oil or Combination	Direct Drive from the Blower Motor								
Minimum Ampacity - Standard									
Blower Motor - Gas Firing Only, [115]230/1/60	[9.8] 4.9	[13.8] 6.9	[13.8] 6.9	[13.8] 6.9	[16] 8	[16] 8	[24] 12		
Blower Motor - Oil or Combination, [115]230/1/60	[13.8] 6.9	[16] 8	[16] 8	[16] 8	[20] 10	[20] 10	[24] 12		
Blower Motor - Gas, 230/3/60								6.8	9.6
Blower Motor - Oil or Combination, 230/3/60								9.6	9.6
Blower Motor - Gas, 460/3/60								3.4	4.8
Blower Motor - Oil or Combination, 460/3/60								4.8	4.8
Blower Motor - Gas, Oil or Combination, 400/3/50								2.8	4.2
Blower Motor - Gas, 575/3/60								2.7	3.9
Blower Motor - Oil or Combination, 575/3/60								3.9	3.9
Remote Oil Pump, [230]460/3/60									
Control Circuit @115/1/60	1.7	1.7	1.7	1.9	1.9	1.9	2.4	2.4	2.4
Weights									
Operating Weight, lbs.	6,600	6,600	6,600	7,200	7,200	9,200	9,200	9,200	9,200
Operating Weight, kg	2,994	2,994	2,994	3,266	3,266	4,173	4,173	4,173	4,173
Water Content Normal, gallons	108	108	108	121	121	157	157	157	157
Water Content Normal, liters	409	409	409	458	458	594	594	594	594
Water Content Flooded, gallons	194	194	194	215	215	293	293	293	293
Water Content Flooded, liters	734	734	734	814	814	1109	1109	1109	1109
Shipping Weight, approximate lbs.	5,700	5,700	5,700	6,200	6,200	7,900	7,900	7,900	7,900
Shipping Weight, approximate kg	2,586	2,586	2,586	2,812	2,812	3,583	3,583	3,583	3,583

Notes:

- A. Ratings shown for elevation to 2000 Feet @ 60HZ and uncontrolled emissions. For ratings above 2000 Feet, controlled emissions, and/or 50HZ, contact your local Cleaver-Brooks Representative as fan motor sizes will change.
- B. Steam ratings are for operating pressure of 10 psig and 125 psig with water at 180 F supply.
- C. Input calculated with Nat. Gas @ 1000 Btu/ft³. Propane @ 2500 Btu/ft³. and Oil @ 140,000Btu/gal.
- D. Standard Motors meet the requirements of UL & NEMA and include the following:

Open drip proof design	NEMA Design "B"
1.15 Service Factor	Ball Bearing
Class "B" Insulation	Continuous Duty, 40° C ambient

January, 2016



Table 4. FLX Steam Ratings Sizes 600-1200

Boiler SIZE	600	700	800	900	1000	1100	1200
Ratings [Notes A and B]							
Steam Capacity (lbs. steam/hr from & at 212° F.)	4,934	5,762	6,590	7,418	8,246	9,074	9,902
Steam Capacity [kg/hr from and at 100 C]	2,238	2,614	2,989	3,365	3,740	4,116	4,492
Output Btu/hr	4,786,925	5,590,325	6,393,725	7,197,125	8,000,525	8,803,925	9,607,325
Output Kcal/Hr	1,206,348	1,408,812	1,611,276	1,813,740	2,016,204	2,218,668	2,421,132
Output kW	1,403	1,638	1,874	2,109	2,345	2,580	2,816
Output Boiler Horsepower	143	167	191	215	239	263	287
Approximate Fuel Consumption [Input - Note C]							
Natural Gas [ft ³ /hr] - 15 PSI Steam	5,802	6,776	7,893	8,885	9,877	10,869	11,861
Natural Gas Therms/Hour - 15 PSI Steam	58.0	67.8	78.9	88.9	98.8	108.7	118.6
Natural Gas [m ³ /hr] - 1.03 Bar Steam	164.3	191.9	223.5	251.6	279.7	307.8	335.9
Natural Gas [ft ³ /hr] - 150 PSI Steam	5,910	6,902	7,992	8,996	10,001	11,005	12,009
Natural Gas Therms/Hour - 150 PSI Steam	59.1	69.0	79.9	90.0	100.0	110.0	120.1
Natural Gas [m ³ /hr] - 10.34 Bar Steam	167.3	195.4	226.3	254.7	283.2	311.6	340.1
Propane Gas [ft ³ /hr] - 15 PSI Steam	2,321	2,710	3,157	3,490	3,951	4,348	4,744
Propane Gas [ft ³ /hr] - 150 PSI Steam	2,364	2,761	3,197	3,599	4,000	4,402	4,804
Propane Gas [m ³ /hr] - 1.03 Bar Steam	65.7	76.8	89.4	98.8	111.9	123.1	134.3
Propane Gas [m ³ /hr] - 10.34 Bar Steam	66.9	78.2	90.5	101.9	113.3	124.6	136.0
No.2 Oil Fuel - gph, 15 PSI Steam	41.4	48.4	55.4	62.3	69.3	76.2	83.2
No.2 Oil Fuel - gph, 150 PSI Steam	42.2	49.3	56.4	63.5	70.6	77.6	84.7
No.2 Oil Fuel - liters/hour, 1.03 Bar Steam	156.7	183.0	209.2	235.5	261.8	288.1	314.4
No.2 Oil Fuel - liters/hour, 10.34 Bar Steam	159.6	186.3	213.1	239.9	266.7	293.5	320.2
Power Requirements - Uncontrolled Emissions [Notes A and D]							
Blower Motor HP - Gas Firing	5	5	5	7.5	10	10	15
Blower Motor kW - Gas Firing	3.73	3.73	3.73	5.595	7.46	7.46	11.19
Blower Motor HP - Oil or Combination	5	5	5	7.5	10	10	10
Blower Motor kW - Oil or Combination	3.73	3.73	3.73	5.595	7.46	7.46	7.46
Oil Pump HP for Oil or Combination	0.75	0.75	1	1.5	1.5	1.5	1.5
Oil Pump kW for Oil or Combination	0.5595	0.5595	0.746	1.119	1.119	1.119	1.119
Minimum Ampacity - Standard							
Blower Motor - Gas, 230/3/60	15.2	15.2	15.2	22	28	28	42
Blower Motor - Oil or Combination, 230/3/60	15.2	15.2	15.2	22	28	28	42
Blower Motor - Gas, 460/3/60	7.6	7.6	7.6	11	14	14	17
Blower Motor - Oil or Combination, 460/3/60	7.6	7.6	7.6	11	14	14	17
Blower Motor - Gas, Oil or Combination, 400/3/50	8	8	8	12	16	16	16
Blower Motor - Gas, 575/3/60	6.1	6.1	6.1	9	11	11	17
Blower Motor - Oil or Combination, 575/3/60	6.1	6.1	6.1	9	11	11	17
Remote Oil Pump, [230]460/3/60	[3.2] 1.6	[3.2] 1.6	[4.2] 2.1	[6] 3	[6] 3	[6] 3	[6] 3
Remote Oil Pump, 575/3/60	1.3	1.3	1.7	2.4	2.4	2.4	2.4
Control Circuit @115/1/60	2.4	1.9	1.9	1.9	2.4	2.4	2.4
Weights							
Operating Weight, lbs.	9,200	12,500	12,500	12,500	14,100	14,100	14,100
Operating Weight, kg	4,173	5,670	5,670	5,670	6,396	6,396	6,396
Water Content Normal, gallons	157	277	277	277	289	289	289
Water Content Normal, liters	594	1,048	1,048	1,048	1,094	1,094	1,094
Water Content Flooded, gallons	293	464	464	464	562	562	562
Water Content Flooded, liters	1,109	1,756	1,756	1,756	2,127	2,127	2,127
Shipping Weight, approximate lbs	7,900	10,200	10,200	10,200	12,000	12,000	12,000
Shipping Weight, approximate kg	3,583	4,627	4,627	4,627	5,443	5,443	5,443

- Notes:
- A. Ratings shown for elevation to 2000 Feet @ 60HZ and uncontrolled emissions. For ratings above 2000 Feet, controlled emissions, and/or 50HZ, contact your local Cleaver-Brooks Representative as fan motor sizes may change.
 - B. Steam ratings are for operating pressure of 10 psig and 125 psig with water at 180 F supply.
 - C. Input calculated with Nat. Gas @ 1000 Btu/ft³. Propane @ 2500 Btu/ft³. and Oil @ 140,000Btu/gal.
 - D. Standard Motors meet the requirements of UL & NEMA and include the following:

Open drip proof design	NEMA Design "B"
1.15 Service Factor	Ball Bearing
Class "B" Insulation	Continuous Duty, 40° C ambient

January, 2016

