

CBLE



125-800 HP

Boiler Book
05/2017



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The Low Emission feature combines the packaging of induced flue gas recirculation with the Cleaver-Brooks integral front head. The front head routes the flue gases from the fourth pass to the fan and burner assembly for reliable low NO_x performance. The enhanced burner design assures maximum NO_x reduction at all firing rates while maintaining top of the line boiler performance.

Standard Low Emission Options include 60, 30, or 20 ppm packages (all NO_x emission levels are given on a dry volume basis and corrected to 3% O₂):

- NO_x performance for 60 ppm (natural gas corrected to 3% O₂) uses a standard size combustion air fan for induced flue gas recirculation.
- NO_x performance for 30 or 20 ppm (natural gas corrected to 3% O₂) includes a larger combustion air fan/motor assembly and a larger internal NO_x reduction system.

Cleaver-Brooks' commitment to lowering emissions is based on more than 400 low NO_x installations - all passing guaranteed emission performance levels.

FEATURES AND BENEFITS

The Cleaver-Brooks Model CB Boiler - the premium firetube on the market today - includes the four-pass dryback design, five square feet of heating surface per boiler horsepower, and maximum boiler efficiency. In addition to the features of the Model CB Boiler, the Low Emission Option provides the following

Integral Front Head Design

- Single-piece front door.
- Fan cassette assembly for easy access to fan and motor.
- Guaranteed low nitrogen oxide (NO_x) performance.
- Enhanced burner performance.
- Improved flame stability and combustion control.
- Intimate mixing of air and fuel assures minimum CO levels at low NO_x levels.

True Boiler/Burner/Low NO_x Package

- UL/ULC approved package.
- Assures highest fuel-to-steam efficiency.
- Eliminates the need for field installation of burner, controls, or NO_x equipment.
- Single point positioning of fuel and air ensures ease of startup and provides reliable operation.

PRODUCT OFFERING

The Low Emission Option currently is available on:

- 125 - 800 hp Model CB Firetube Dryback Boilers.
- High-pressure and low-pressure steam and hot water designs.
- Natural Gas, No. 2 oil, or combination fired.
- Retrofit capability.

Standard Equipment

- Model CB Firetube Boiler.
- New integral front head with internal low NO_x system.
- Enhanced burner design.

Available Options

For option details, contact your local Cleaver-Brooks authorized representative.

- Full line of Model CB Firetube options.
- Additional NO_x reduction packages.

DIMENSIONS AND RATINGS

The Model CBLE dimensions and ratings are provided in the tables and figures below.

These dimensions are for reference only; certified drawings from CB are required if clearances are critical.

Table 1. Model CBLE Steam Boiler Ratings

BOILER HP	125	150	200	250	300	350	400	500	600	700	800
RATINGS SEA LEVEL TO 700 FT											
Rated Steam Cap. (lbs/hr from and @ 212 °F)	4313	5175	6900	8625	10350	12075	13800	17250	20700	24150	27600
Btu Output (1000 Btu/hr)	4184	5021	6695	8369	10043	11716	13390	16738	20085	23433	26780
APPROXIMATE FUEL CONSUMPTION AT RATED CAPACITY											
Light Oil (gph) ^A	36.4	43.7	58.3	72.9	87.5	102.1	116.6	145.8	175.0	204.1	233.3
Natural Gas (cfh) MBtu	5103	6123	8165	10206	12247	14288	16329	20412	24494	28576	32659
Gas (Therm/hr)	51.0	61.2	81.6	102.1	122.5	142.9	163.3	204.1	244.9	285.8	326.6
POWER REQUIREMENTS - SEA LEVEL TO 700 FT, 60 HZ											
Blower Motor hp	Refer to Tables 3 and 4										
Oil Pump Motor, hp No. 2 Oil	1/2	1/2	1/2	1/2	3/4	3/4	3/4	3/4	3/4	1	1
Air Compressor Motor hp (Oil firing Only)	3	3	3	5	5	5	7-1/2	7-1/2	7-1/2	7-1/2	7-1/2

NOTES:

A. Based on 140,000 Btu/gal.

Table 2. Model CBLE Hot Water Boiler Ratings

BOILER HP	125	150	200	250	300	350	400	500	600	700	800
POWER REQUIREMENTS - SEA LEVEL TO 700 FT, 60 HZ											
Rated Cap. Btu Output (1000 Btu/hr)	4184	5021	6695	8369	10043	11716	13390	16738	20085	23433	26780
APPROXIMATE FUEL CONSUMPTION AT RATED CAPACITY											
Light Oil (gph) ^A	36.4	43.7	58.3	72.9	87.5	102.1	116.6	145.8	175.0	204.1	233.3
Natural Gas (cfh) MBtu	5103	6123	8165	10206	12247	14288	16329	20412	24494	28576	32659
Gas (Therm/hr)	51.0	61.2	81.6	102.1	122.5	142.9	163.3	204.1	244.9	285.8	326.6
POWER REQUIREMENTS - SEA LEVEL TO 700 FT, 60 HZ											
Blower Motor hp	Refer to Tables 3 and 4										
Oil Pump Motor, hp No. 2 Oil	1/2	1/2	1/2	1/2	3/4	3/4	3/4	3/4	3/4	1	1
Air Compressor Motor hp (Oil firing Only)	3	3	3	5	5	5	7-1/2	7-1/2	7-1/2	7-1/2	7-1/2

NOTES:

A. Based on 140,000 Btu/gal.

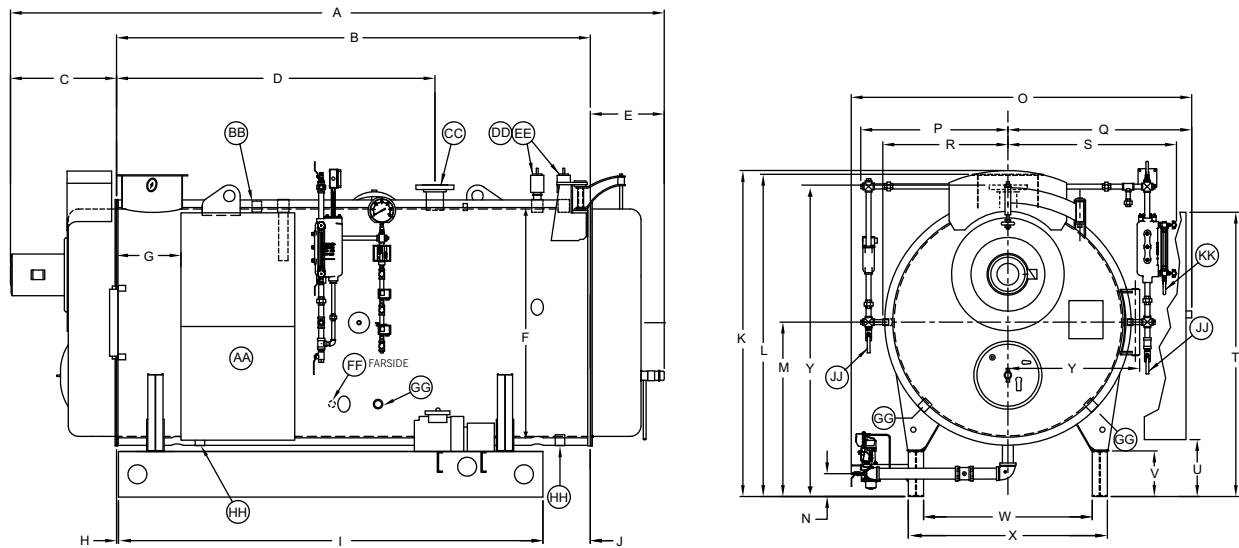


Figure 1. Dimensions CBLE Steam - 125-200 HP

(measurements shown in inches)

Dimensions Steam 125-200 HP

Description	DIM	Boiler HP		
		125	150	200
LENGTHS				
Length Overall	A	173	196.5	228.5
Shell	B	125	149	180
Front Head Extension	C	28	28	29
Front Ring Flange to Nozzle - 15#	D	88	90	96
Front Ring Flange to Nozzle - 150#	D	84	84	96
Rear Head Extension	E	19.5	19.5	19.5
Front Ring Flange to Panel	G	17	17	17
Ring Flange to Base	H	0.5	0.5	0.5
Base Frame	I	112	136	167
Rear Flange Ring to Base	J	12.5	12.5	12.5
HEIGHTS				
Ht Overall	K	87	87	87
Base to Vent Outlet	L	87	87	87
Base to Boiler Centerline	M	46	46	46
Base to Gas Train	N	6	8.5	8.5
HEIGHTS (continued)				
Base to Panel Top	T	75	75	77
Base to Panel Bottom	U	15	15	17
Height of Base	V	12	12	12
Base to Steam Nozzle	Y	82.38	82.38	82.38
WIDTHS				
Width Overall	O	89.88	89.875	90.5
Center to ALWCO	P	38.75	38.75	38.75

Dimensions Steam 125-200 HP (Continued)

Description	DIM	Boiler HP		
		125	150	200
Center to Outside Control Panel	Q	48.5	48.5	48.5
Center to Lagging	R	33	33	33
Center to WC	S	44.5	45	45
Base Inside	W	44.5	44.5	44.5
Base Outside	X	52.5	52.5	52.5
Boiler I.D.	F	60	60	60
CONNECTIONS				
Electric - Main Power Supply	AA	460 / 3 / 60	460 / 3 / 60	460 / 3 / 60
Surface Blowoff (with collector pipe)	BB	1	1	1
Steam Outlet 15# (150# Flange)	CC	8	8	10
Steam Outlet 150# (300# Flange)	CC	4	4	4
Chemical Feed	FF	1	1	1
Feed Water (2)	GG	1.5	1.5	2
Blowdown (2) 150#	HH	1.5	1.5	1.5
Drain (2) 15#	HH	1.5	1.5	2
Water Column Blowdown	JJ	0.75	0.75	0.75
Gauge Glass Blowdown	KK	.025	0.25	0.25
VENT STACK				
Diameter (OD) (flgd. connection)		16	16	16
CLEARANCES				
Rear Door Swing (Davited)		32	32	32
Front Door Swing		67	67	67
Tube Removal, Rear		115	139	170
Tube Removal, Front		103	127	158
MINIMUM BOILER ROOM LENGTH ALLOWING FOR DOOR SWING AND TUBE REMOVAL:				
From Rear of Boiler		307	355	417
From Front of Boiler		260	308	370
Through Window or Doorway		224	248	279
WEIGHT IN LBS				
Normal Water Capacity		5750	7250	8625
Approx. Ship Wt. 15 psig		11300	12600	14600
Approx. Ship Wt. 150 psig		12400	13500	15600
Approx. Ship Wt. 200 psig		13000	14200	16400

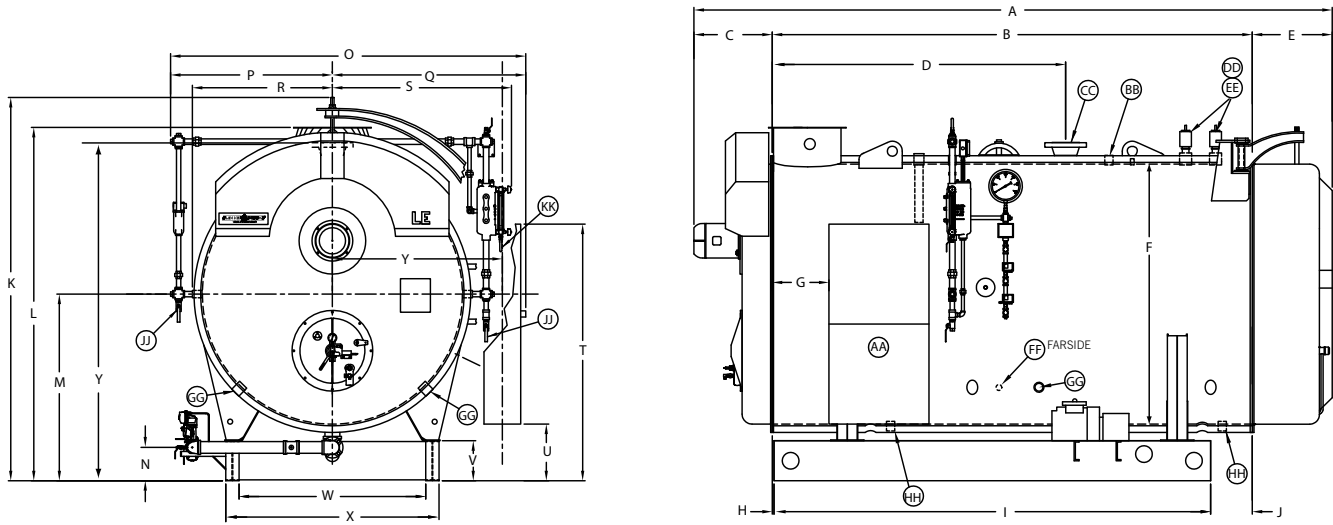


Figure 2. Dimensions CBLE Steam - 250-350 HP

(measurements shown in inches)

Dimensions Steam 250-350 HP

Description	DIM	Boiler HP		
		250	300	350
LENGTHS				
Length Overall	A	191.5	220	250
Shell	B	144	171	201
Front Head Extension	C	23.5	25	25
Front Ring Flange to Nozzle - 15#	D	90	98	112
Front Ring Flange to Nozzle - 150#	D	88	98	112
Rear Head Extension	E	24	24	24
Front Ring Flange to Panel	G	17	23	23
Ring Flange to Base	H	0.5	0.5	0.5
Base Frame	I	131	158	188
Rear Flange Ring to Base	J	12.5	12.5	12.5
HEIGHTS				
Ht Overall	K	115	115	115
Base to Vent Outlet	L	106	106	106
Base to Boiler Centerline	M	56	56	56
Base to Gas Train	N	10	10	10
Base to Panel Top	T	77	77	77
Base to Panel Bottom	U	17	17	17
Height of Base	V	12	12	12
Base to Steam Nozzle	Y	101.50	101.50	101.50
WIDTHS				
Width Overall	O	106.5	106.5	108.75
Center to ALWCO	P	48.5	48.5	48.5
Center to Outside Control Panel	Q	58	58	58
Center to Lagging	R	42	42	42

Dimensions Steam 250-350 HP (Continued)

Description	DIM	Boiler HP		
		250	300	350
Center to WC	S	53.75	53.75	53.75
Base Inside	W	56	56	56
Base Outside	X	64	64	64
Boiler I.D.	F	78	78	78
CONNECTIONS				
Electric - Main Power Supply	AA	460 / 3 / 60	460 / 3 / 60	460 / 3 / 60
Surface Blowoff (with collector pipe)	BB	1	1	1
Steam Outlet 15# (150# Flange)	CC	12	12	12
Steam Outlet 150# (300# Flange)	CC	6	6	6
Chemical Feed	FF	1	1	1
Feed Water (2)	GG	2	2	2.5
Blowdown (2) 150#	HH	1.5	1.5	1.5
Drain (2) 15#	HH	2	2	2
Water Column Blowdown	JJ	0.75	0.75	0.75
Gauge Glass Blowdown	KK	0.25	0.25	0.25
VENT STACK				
Diameter (OD) (flgd. connection)		20	20	20
CLEARANCES				
Rear Door Swing		43	43	43
Front Door Swing		89	89	89
Tube Removal, Rear		131	157	187
Tube Removal, Front		116	142	172
MINIMUM BOILER ROOM LENGTH ALLOWING FOR DOOR SWING AND TUBE REMOVAL RMOVAREMOVAL:				
From Rear of Boiler		364	417	477
From Front of Boiler		303	356	416
Through Window or Doorway		275	302	332
WEIGHT IN LBS				
Normal Water Capacity		10670	13000	15465
Approx. Ship Wt. 15 psig		21500	23600	26800
Approx. Ship Wt. 150 psig		22800	25200	27800
Approx. Ship Wt. 200 psig		24600	27200	29300

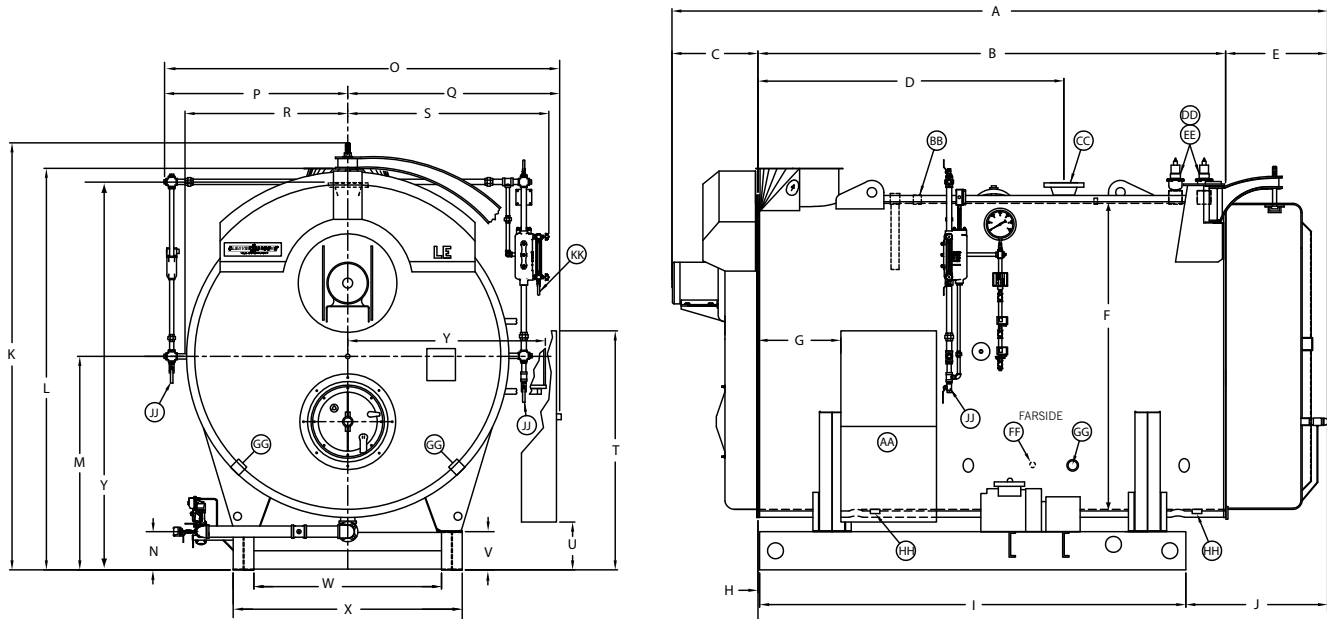


Figure 3. Dimensions CBLE Steam - 400-800 HP

(measurements shown in inches)

Dimensions Steam 400-800 HP

Description	DIM	Boiler HP				
		400	500	600	700	800
LENGTHS						
Length Overall	A	205.75	227.75	259.75	298.75	298.75
Shell	B	146.75	167.5	199.75	232.75	232.75
Front Head Extension	C	27	28	28	34	34
Front Ring Flange to Nozzle - 15#	D	98	101	96	112	112
Front Ring Flange to Nozzle - 150#	D	96	100	96	112	112
Rear Head Extension	E	32	32	32	32	32
Front Ring Flange to Panel	G	26	26	26	26	26
Ring Flange to Base	H	0.5	0.5	0.5	0.5	0.5
Base Frame	I	133.75	154.75	186.75	219.75	219.75
Rear Flange Ring to Base	J	12.5	12.5	12.5	12.5	12.5
HEIGHTS						
Ht Overall	K	134	134	134	134	134
Base to Vent Outlet	L	126	126	126	126	126
Base to Boiler Centerline	M	67	67	67	67	67
Base to Gas Train	N	12	12	12	12	12
Base to Panel Top	T	75	75	75	75	75
Base to Panel Bottom	U	15	15	15	15	15
Height of Base	V	12	12	12	12	12
Base to Steam Nozzle	Y	121.5	123.5	121.5	121	121
WIDTHS						
Width Overall	O	124	124.25	124	124	124
Center to ALWCO	P	57.5	57.5	57.5	57.5	57.5
Center to Outside Control Panel	Q	66.5	66.5	66.5	66.5	66.5

Dimensions Steam 400-800 HP (Continued)

Description	DIM	Boiler HP				
		400	500	600	700	800
Center to Lagging	R	51	51	51	51	51
Center to WC	S	63	63	63	63	63
Base Inside	W	58.88	58.88	58.88	58.88	58.88
Base Outside	X	71.88	71.88	71.88	71.88	71.88
Boiler I.D.	F	96	96	96	96	96
CONNECTIONS						
Electric - Main Power Supply	AA	460 / 3 / 60	460 / 3 / 60	460 / 3 / 60	460 / 3 / 60	460 / 3 / 60
Surface Blowoff (with collector pipe)	BB	1	1	1	1	1
Steam Outlet 15# (150# Flange)	CC	12	12	12	12	12
Steam Outlet 150# (300# Flange)	CC	6	8	8	8	8
Chemical Feed	FF	1	1	1	1	1
Feed Water (2)	GG	2.5	2.5	2.5	2.5	2.5
Blowdown/Drain (2)	HH	2	2	2	2	2
Water Column Blowdown	JJ	0.75	0.75	0.75	0.75	0.75
Gauge Glass Blowdown	KK	0.25	0.25	0.25	0.25	0.25
VENT STACK						
Diameter (OD) (flgd. connection)		24	24	24	24	24
CLEARANCES						
Rear Door Swing		53	53	53	53	53
Front Door Swing		108	108	108	108	108
Tube Removal, Rear		131	152	184	217	217
Tube Removal, Front		114	135	167	200	200
MINIMUM BOILER ROOM LENGTH ALLOWING FOR DOOR SWING AND TUBE REMOVAL						
From Rear of Boiler		386	428	492	558	558
From Front of Boiler		314	356	420	486	486
Through Window or Doorway		308	329	361	394	394
WEIGHT IN LBS						
Normal Water Capacity		14810	15950	19270	23000	23000
Approx. Ship Wt. 15 psig		33500	37110	42300	49500	49600
Approx. Ship Wt. 150 psig		36570	39970	45025	52050	52150
Approx. Ship Wt. 200 psig		39680	43580	49400	57315	57415

Dimensions HW 125-200 HP (Continued)

Description	DIM	Boiler HP		
		125	150	200
Base, Inside	N	44-1/2	44-1/2	44-1/2
HEIGHTS				
Overall	OO	87	87	87
Base to Vent Outlet	O	87	87	87
Base to Return and Outlet	X	82-3/8	82-3/8	82-3/8
Height of Base	Q	12	12	12
Base to Bottom of Boiler	R	16	16	16
BOILER CONNECTION				
Auxiliary Connection	Z	1	1	1
Water Return Flange	T	6 ^A	6 ^A	6 ^A
Water Outlet Flange (2" Dip Tube Included)	U	6 ^A	6 ^A	6 ^A
Drain, Front and Rear	W	1-1/2	1-1/2	2
Air Vent	Y	1-1/2	1-1/2	1-1/2
VENT STACK				
Diameter (flgd. connection)	BB	16	16	16
MINIMUM CLEARANCES				
Rear Door Swing	DD	32	32	32
Front Door Swing	EE	67	67	67
Tube Removal, Rear	FF	115	139	170
Tube, Removal, Front	GG	103	127	158
MINIMUM BOILER ROOM LENGTH ALLOWING FOR DOOR SWING AND TUBE REMOVAL FROM:				
Rear of Boiler	RR	307	355	417
Front of Boiler	RF	260	308	370
Thru Window or Doorway	RD	224	248	279
WEIGHT IN LBS				
Water Capacity Flooded		7670	9295	11130
Approx. Ship. Wgt. – 30 psig		11400	12500	14500
Approx. Ship. Wgt. – 125 psig		11800	12900	14900

NOTES: All connections are threaded unless indicated.
A. ANSI 150 psig flange.

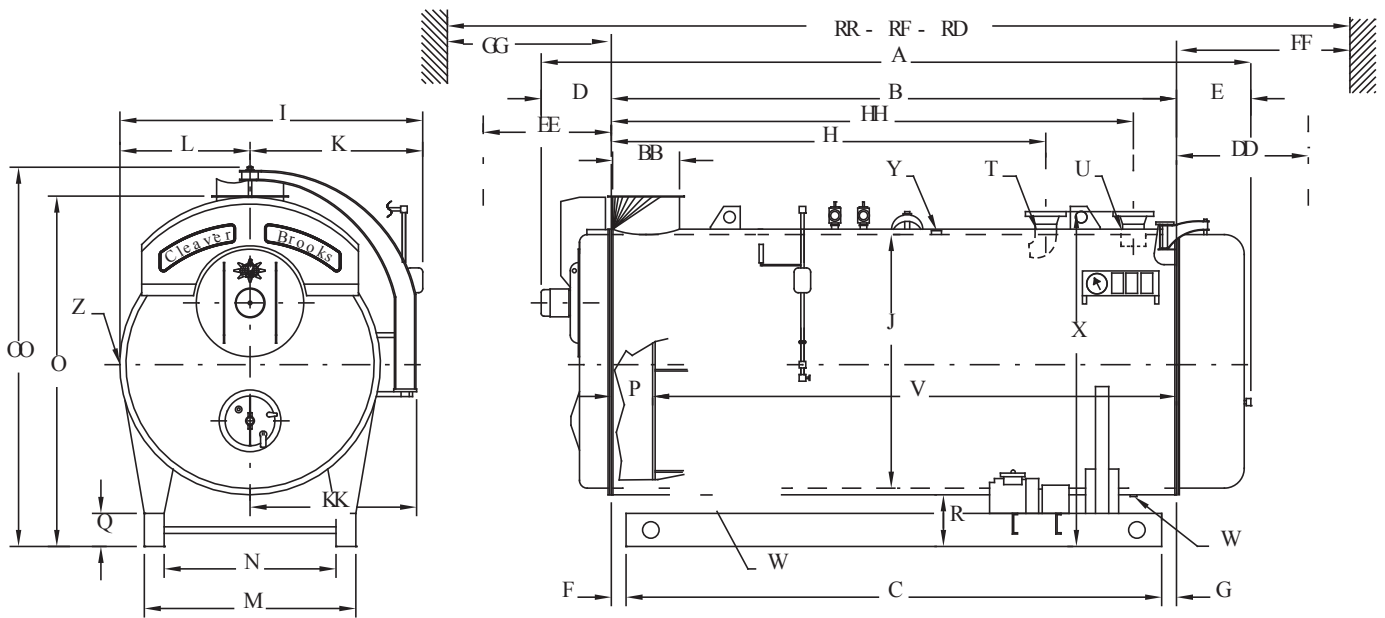


Figure 5. Dimensions CBLE Hot Water 250-350 HP

(measurements shown in inches)

Dimensions HW 250-350 HP

Description	DIM	Boiler HP		
		250	300	350
LENGTHS				
Overall (60 ppm System)	A	191-1/2	220	252
Shell	B	144	171	201
Base Frame	C	131	158	188
Front Head Extension (60 ppm System)	D	23-1/2	25	27
Rear Head Extension	E	24	24	24
Front Ring Flange to Return	H	103-1/2	130	160
Front Ring Flange to Outlet	HH	131	158	188
Ring Flange to Base	F	1/2	1/2	1/2
Over Tubesheets	V	129	156	186
Shell Extension	P	15	15	15
Rear Flange Ring to Base	G	12-1/2	12-1/2	12-1/2
WIDTHS				
Overall	I	93	93	93
I.D. Boiler	J	78	78	78
Center to Entrance Box	K	51	51	51
Center to Outside Hinge	KK	51	51	51
Center to Lagging	L	42	42	42
Base, Outside	M	64	64	64
Base, Inside	N	52	52	52

Dimensions HW 250-350 HP (Continued)

Description	DIM	Boiler HP		
		250	300	350
HEIGHTS				
Overall	OO	115	115	115
Base to Vent Outlet	O	106	106	106
Base to Return and Outlet	X	101-1/2	101-1/2	101-1/2
Height of Base	Q	10	10	10
Base to Bottom of Boiler	R	17	17	17
BOILER CONNECTION				
Auxiliary Connection	Z	1-1/4	1-1/4	1-1/4
Water Return Flange (2" Dip Tube included)	T	8 ^A	8 ^A	8 ^A
Water Outlet Flange (2" Dip Tube Included)	U	8 ^A	8 ^A	8 ^A
Air Vent	Y	1-1/2	1-1/2	1-1/2
Drain, Front and Rear	W	2	2	2
VENT STACK				
Diameter (flgd. connection)	BB	20	20	20
MINIMUM CLEARANCES				
Rear Door Swing	DD	43	43	43
Front Door Swing	EE	89	89	89
Tube Removal, Rear	FF	131	157	187
Tube, Removal, Front	GG	116	142	172
MINIMUM BOILER ROOM LENGTH ALLOWING FOR DOOR SWING AND TUBE REMOVAL FROM:				
Rear of Boiler	RR	364	417	477
Front of Boiler	RF	303	356	416
Thru Window or Doorway	RD	275	302	332
WEIGHT IN LBS				
Water Capacity Flooded		13880	16840	20090
Approx. Ship. Wgt. – 30 psig		21400	23500	26700
Approx. Ship. Wgt. – 125 psig		22200	24300	27500

NOTES: All connections are threaded unless indicated.
A. ANSI 150 psig flange.

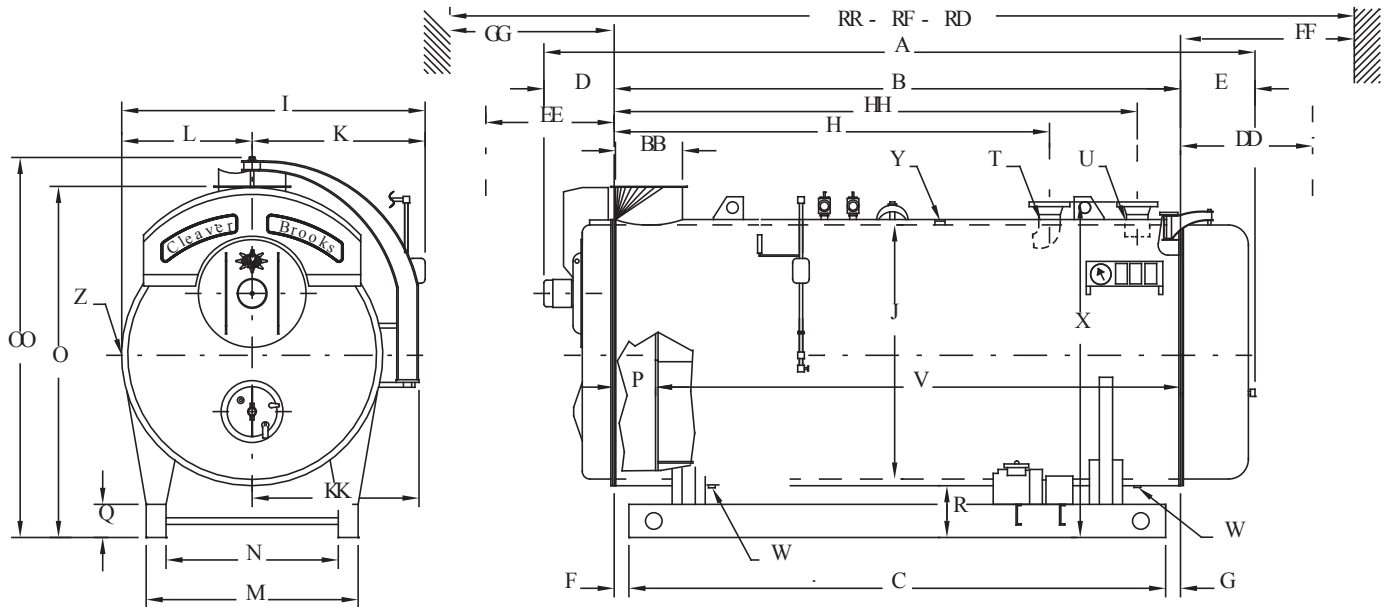


Figure 6. Dimensions CBLE Hot Water 400-800 HP

(measurements shown in inches)

Dimensions HW 400-800 HP

Description	DIM	Boiler HP				
		400	500	600	700	800
LENGTHS						
Overall (60 ppm System)	A	206	228	262	299	300
Shell	B	147	168	200	233	233
Base Frame	C	134	155	187	220	220
Front Head Extension (60 ppm System)	D	27	28	30	34	35
Rear Head Extension	E	32	32	32	32	32
Shell Ring Flange to Base	F	1/2	1/2	1/2	1/2	1/2
Rear Ring Flange to Base	G	12-1/2	12-1/2	12-1/2	12-1/2	12-1/2
Shell Flange to Outlet	HH	139-1/2	156-1/2	182-1/2	216-1/2	216-1/2
Shell Flange to Return	H	107	125	151-1/2	185	185
Over Tubesheets	V	130	151	183	216	216
Shell Extension	P	17	17	17	17	17
WIDTHS						
Overall	I	113	113	113	113	115
I.D. Boiler	J	96	96	96	96	96
Center to Entrance Box	K	62	62	62	62	64
Center to Outside Hinge	KK	62	62	62	62	62
Center to Lagging	L	51	51	51	51	51
Base, Outside	M	72	72	72	72	72

Dimensions HW 400-800 HP (Continued)

Description	DIM	Boiler HP				
		400	500	600	700	800
Base, Inside	N	56	56	56	56	56
HEIGHTS						
Overall	OO	134	134	134	134	134
Base to Vent Outlet	O	126	126	126	126	126
Height of Base	Q	12	12	12	12	12
Base to Bottom of Boiler	R	19	19	19	19	19
Base to Return and Outlet	X	121-9/16	121-9/16	121-9/16	121-9/16	121-9/16
BOILER CONNECTIONS						
Auxiliary Connection	Z	1-1/4	1-1/4	1-1/4	1-1/4	1-1/4
Drain, Front and Rear	W	2	2	2	2	2
Water Return	T	10 ^A	10 ^A	12 ^A	12 ^A	12 ^A
Water Outlet (2" Dip Tube Included)	U	10 ^A	10 ^A	12 ^A	12 ^A	12 ^A
Air Vent	Y	2	2	2	2	2
VENT STACK						
Diameter (Flanged Connection)	BB	24	24	24	24	24
MINIMUM CLEARANCES						
Rear Door Swing	DD	53	53	53	53	53
Front Door Swing	EE	108	108	108	108	108
Tube Removal, Rear	FF	131	152	184	217	217
Tube Removal, Front	GG	114	135	167	200	200
MINIMUM BOILER ROOM LENGTH ALLOWING FOR DOOR SWING AND TUBE REMOVAL FROM:						
Rear of Boiler	RR	386	428	492	558	558
Front of Boiler	RF	314	356	420	486	486
Thru Window or Doorway	RD	308	329	361	394	394
WEIGHT IN LBS						
Normal Water Capacity		20015	23300	28260	33360	33360
Approx. Ship. Wgt. – 30 psig		33300	36900	42150	49650	49750
Approx. Ship. Wgt. – 125 psig		37270	40780	46005	53300	53400

NOTES: All connections are threaded unless indicated:

A. ANSI 150 psig flange.

Table 3. CBLE Blower Motor Selection - operating pressures 150 psig and less, and all hot water boilers

BOILER HP	MOTOR HP		
	60 PPM	30 PPM	20 PPM
125	5	10	10
150	7.5	10	10
200	15	15	NA
250	7.5	10	15
300	10	15	30
350	15	25	40
400	10	15	20
500	15	20	30
600	25	30	60
700	30	50	75
800	50	75	NA

NOTES: For elevations above 700' - contact your local Cleaver-Brooks authorized representative.

Table 4. CBLE Blower Motor Selection - operating pressures greater than 150 psig (steam boilers)

BOILER HP	MOTOR HP		
	60 PPM	30 PPM	20 PPM
125	5	10	10
150	10	10	15
200	15	20	NA
250	7.5	10	20
300	10	20	40
350	20	30	50
400	10	15	25
500	20	25	40
600	25	40	60
700	40	60	75 ^C
800	60	75 ^A	NA

NOTES: For elevation above 700' - contact your local Cleaver-Brooks authorized representative.

A. Downrate to 770 hp.

B. Downrate to 675 hp.

C. Downrate to 660 hp.

Table 5. Blower Motor Selection CB-LE NTI Boilers

Altitude: 700 ft and less - Design Pressure: 150 psi and less

Nominal Boiler Size	15 ppm Blower Motor HP	9 ppm Blower Motor HP
125	7.5	7.5
150	7.5	10
200	15	20
250	10	10
300	20	20
350	20	25
400	20	20
500	25	30
600	40	50
700	60	75
*800	75	75

* 800 HP - to be de-rated to 720 HP for 9 ppm and to 750 HP for 15 ppm.

Table 6. Turndown Guarantee for CB-LE NTI Boilers - Natural Gas & #2 Oil

Boiler Size	Turndown	
	9 ppm	15 ppm
125	4:1	4:1
150	4:1	5:1
200	4:1	5:1
250	5:1	5:1
300	5:1	5:1
350	5:1	5:1
400	5:1	6:1
500	5:1	6:1
600	6:1	6:1
700	7:1	7:1
800*	7:1	7:1

*800 HP to be derated to 720 HP for 9 ppm and 750 HP for 15 ppm

Table 7. Model CB-LE Boiler Weights

BOILER HP	FUEL SERIES	HOT WATER		STEAM		
		30 PSIG	125 PSIG	15 PSIG	150 PSIG	200 PSIG
125	100	11200	11600	11300	12000	12600
	200	11400	11800	11500	12400	13000
	700	11300	11700	11400	12300	12900
150	100	12300	12700	12400	13200	13900
	200	12500	12900	12600	13500	14200
	700	12300	12700	12400	13300	14000
200	100	14400	14800	14500	15500	16300
	200	14500	14900	14600	15600	16400
	700	14500	14900	14600	15600	16400
250	100	20700	21500	20800	22000	23800
	200	21400	22200	21500	22800	24600
	700	20900	21700	21000	22500	24300
300	100	23100	23900	23200	24800	26800
	200	23500	24300	23600	25200	27200
	700	23400	24200	23500	25000	27000
350	100	26200	27000	26300	27600	29100
	200	26700	27500	26800	27800	29300
	700	26400	27200	26500	27700	29200
400	100	33000	36970	33200	36270	39380
	200	33300	37270	33500	36570	39680
	700	33200	37170	33400	36470	39580
500	100	36600	40470	36810	39670	43480
	200	36900	40780	37110	39970	43580
	700	36800	40680	37010	39870	43280
600	100	41850	45905	42000	44725	49100
	200	42150	46005	42300	45025	49400
	700	42050	45915	42200	44925	49300
700 800	100	49450	53000	49300	51850	57015
	200	49750	53300	49600	52150	57315
	700	49650	53200	49500	52050	57215

NOTES:

1. Weights shown are based on standard product offering for current listed boilers. If units are of special design and construction, actual weight will be determined at time of shipment. Shipment will then be made on shippers weight and count. All weights are in US pounds.

Table 8. Steam Boiler Safety Valve Openings

VALVE SETTING	15 PSIG STEAM		100 PSIG STEAM		125 PSIG STEAM		150 PSIG STEAM		200 PSIG STEAM		250 PSIG STEAM		300 PSIG STEAM	
BOILER HP	NO. OF VALVES REQ'D	OUTLET SIZE (IN.)	NO. OF VALVES REQ'D	OUTLET SIZE (IN.)	NO. OF VALVES REQ'D	OUTLET SIZE (IN.)	NO. OF VALVES REQ'D	OUTLET SIZE (IN.)	NO. OF VALVES REQ'D	OUTLET SIZE (IN.)	NO. OF VALVES REQ'D	OUTLET SIZE (IN.)	NO. OF VALVES REQ'D	OUTLET SIZE (IN.)
125	1	3	2	1-1/2	2	(1) 1-1/2 (1) 1-1/4	2	(1) 1-1/2 (1) 1-1/4	2	(1) 1-1/4 (1) 1	2	1	2	1
150	1	3	2	(1) 2 (1) 1-1/2	2	1-1/4	2	(1) 1-1/2 (1) 1-1/4	2	(1) 1 (1) 1-1/4	2	1	2	1
200	2	2-1/2	2	2	2	1-1/2	2	1-1/2	2	(1) 1-1/2 (1) 1-1/4	2	1-1/4	2	(1) 1 (1) 1-1/4
250	2	(1) 2-1/2 (1) 3	2	(1) 2-1/2 (1) 2	2	(1) 2 (1) 1-1/2	2	(1) 2 (1) 1-1/2	2	(1) 1-1/2 (1) 1-1/4	2	(1) 1-1/2 (1) 1-1/4	2	1-1/4
300	2	3	2	(1) 2-1/2 (1) 2	2	2	2	(1) 2 (1) 1-1/2	2	1-1/2	2	(1) 1-1/2 (1) 1-1/4	2	(1) 1-1/2 (1) 1-1/4
350	3	(1) 2 (2) 3	3	(1) 2-1/2 (2) 2	2	(1) 2 (1) 1-1/2	2	2	2	(1) 1-1/2 (1) 2	2	1-1/2	2	(1) 1-1/2 (1) 1-1/4
400	3	(2) 3 (1) 2-1/2	3	(1) 2 (2) 2-1/2	2	(1) 2 (1) 2-1/2	2	(1) 2-1/2 (1) 2	2	(1) 1-1/2 (1) 2	2	(1) 2 (1) 1-1/2	2	1-1/2
500	3	(3) 3	3	2-1/2	2	2-1/2	2	(1) 2-1/2 (1) 2	2	(1) 2 (1) 2-1/2	2	(1) 2 (1) 1-1/2	2	(1) 1-1/2 (1) 2
600	4	3	4	(3) 2-1/2 (1) 2	3	2-1/2	2	2-1/2	2	(1) 2 (1) 2-1/2	2	2	2	2
700	5	(3) 3 (2) 2-1/2	5	(3) 2-1/2 (2) 2	3	2-1/2	3	(2) 2-1/2 (1) 2	2	2-1/2	2	(1) 2 (1) 2-1/2	2	2
800	5	(3) 3 (2) 2-1/2	5	(3) 2-1/2 (2) 2	4	(3) 2-1/2 (1) 2	3	(2) 2-1/2 (1) 2	2	2-1/2	2	(1) 2 (1) 2-1/2	2	(1) 2 (1) 2-1/2

NOTES: Valve manufacturers are Kunkle, Consolidated or Conbraco, depending on availability. This table revised 04/2012.

Table 9. Hot Water Boiler Relief Valve Openings

VALVE SETTING	30 PSIG HW		60 PSIG HW		100 PSIG HW		125 PSIG HW	
BOILER HP	NO. OF VALVES REQ'D	OUTLET SIZE (IN.)	NO. OF VALVES REQ'D	OUTLET SIZE (IN.)	NO. OF VALVES REQ'D	OUTLET SIZE (IN.)	NO. OF VALVES REQ'D	OUTLET SIZE (IN.)
125	1	2-1/2	1	2	1	2	1	1-1/4
150	1	2-1/2	1	2-1/2	1	2	1	2
200	2	(1) 2-1/2 (1) 1-1/4	1	2-1/2	1	2	1	2
250	2	(1) 2 (1) 2-1/2	1	2-1/2	1	2-1/2	1	2
300	2	2-1/2	2	(1) 1 (1) 2-1/2	1	2-1/2	1	2-1/2
350	3	(2) 2-1/2 (1) 1	2	(1) 2-1/2 (1) 2	1	2-1/2	1	2-1/2
400	3	(1) 2 (2) 2-1/2	2	(1) 2 (2) 2-1/2	2	(1) 1 (1) 2-1/2	1	2-1/2
500	4	(1) 1 (3) 2-1/2	2	2-1/2	2	(1) 2-1/2 (1) 1-1/4	2	(1) 1 (1) 2-1/2
600	4	(3) 2-1/2 (1) 2	3	(1) 1-1 (2) 2-1/2	2	(1) 2 (1) 2-1/2	2	(1) 2-1/2 (1) 1-1/4
700 & 800	5	(1) 1 (4) 2-1/2	3	(1) 2 (2) 2-1/2	2	2-1/2	2	(1) 2-1/2 (1) 2

NOTES: Hot water relief valves are Kunkle #537.

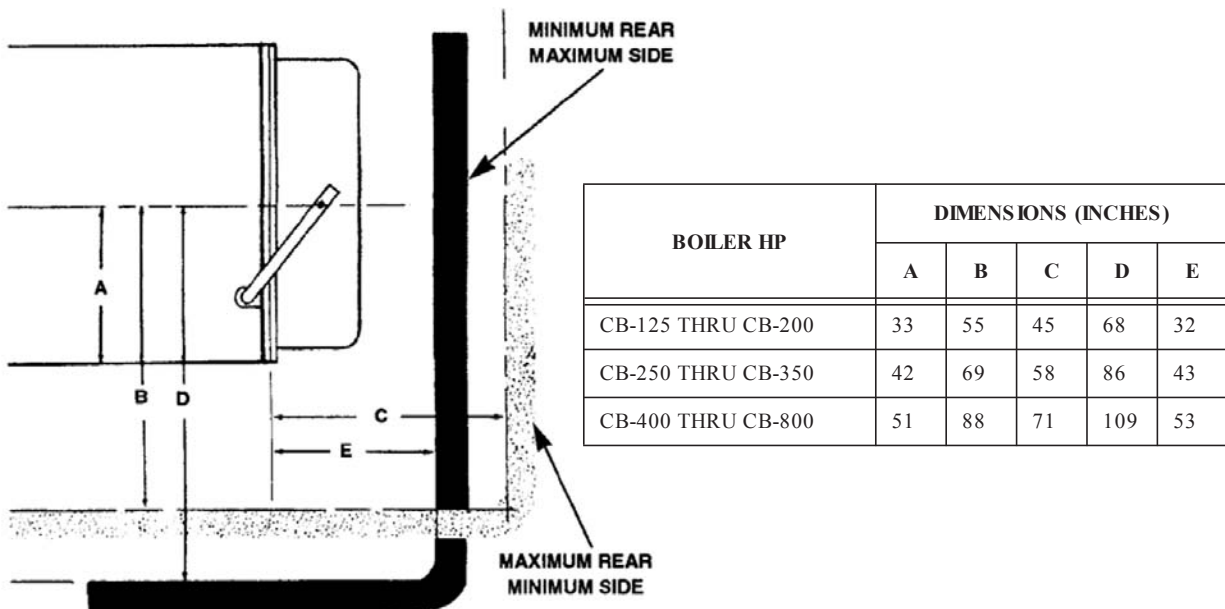
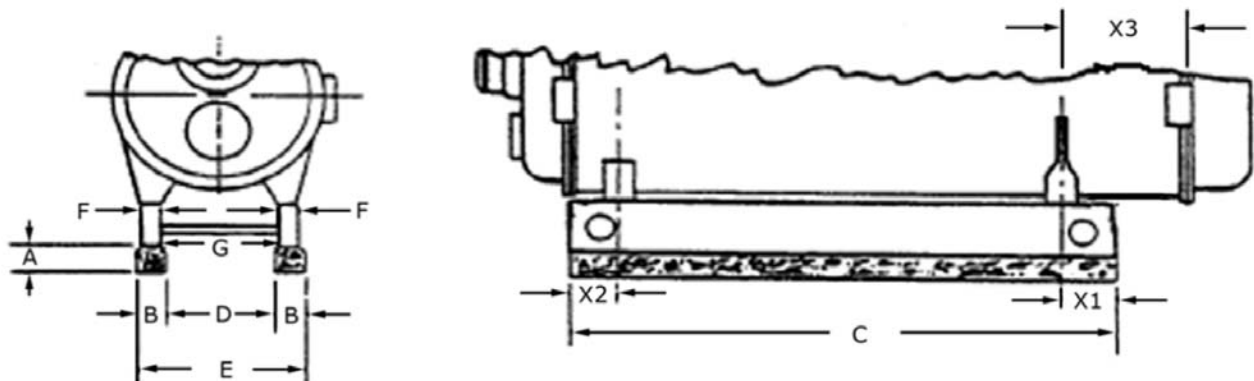


Figure 7. Space required to open rear head on CBLE boilers equipped with davits



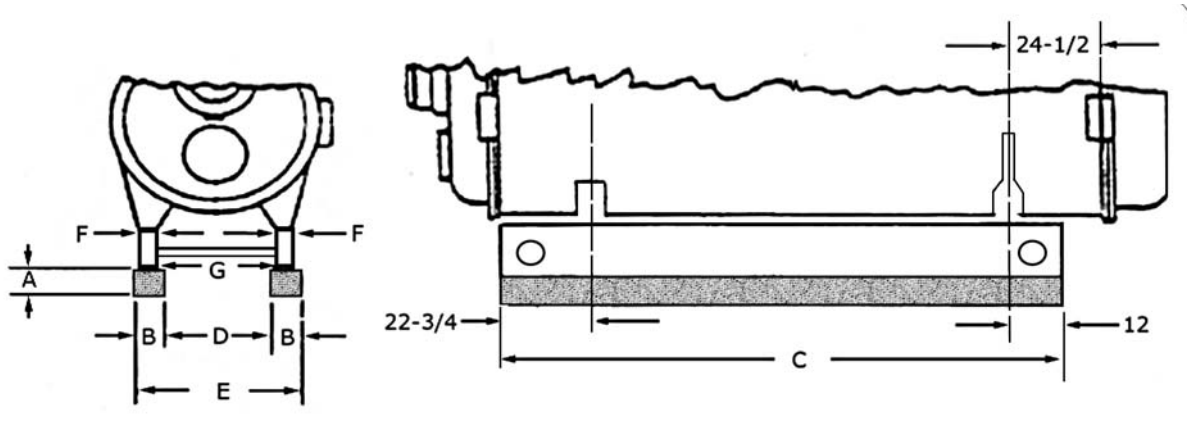
BOILER HP	A	B	C	D	E	F	G	X1	X2	X3
125	6	9	112	39-1/2	57-1/2	4	44-1/2	10	9-3/4	22-1/2
150	6	9	136	39-1/2	57-1/2	4	44-1/2	10	9-3/4	22-1/2
200	6	9	167	39-1/2	57-1/2	4	44-1/2	10	9-3/4	22-1/2
250	6	12	131	46	70	4	56	10	22	22-1/2
300	6	12	158	46	70	4	56	10	22	22-1/2
350	6	12	188	46	70	4	56	10	22	22-1/2

NOTE:

All numbers in table are in inches.

6-inch high mounting piers recommended for use beneath the boiler base frame. The use of these piers provides increased inspection accessibility to the piping beneath the boiler and added height for washing down the area beneath the boiler.

Figure 8. Model CBLE Boiler Mounting Piers (60'' and 78'')



BOILER HP	A	B	C	D	E	F	G
400	6	14	134	50	78	6-1/2	58-7/8
500	6	14	155	50	78	6-1/2	58-7/8
600	6	14	187	50	78	6-1/2	58-7/8
700-800	6	14	220	50	78	6-1/2	58-7/8

NOTE:

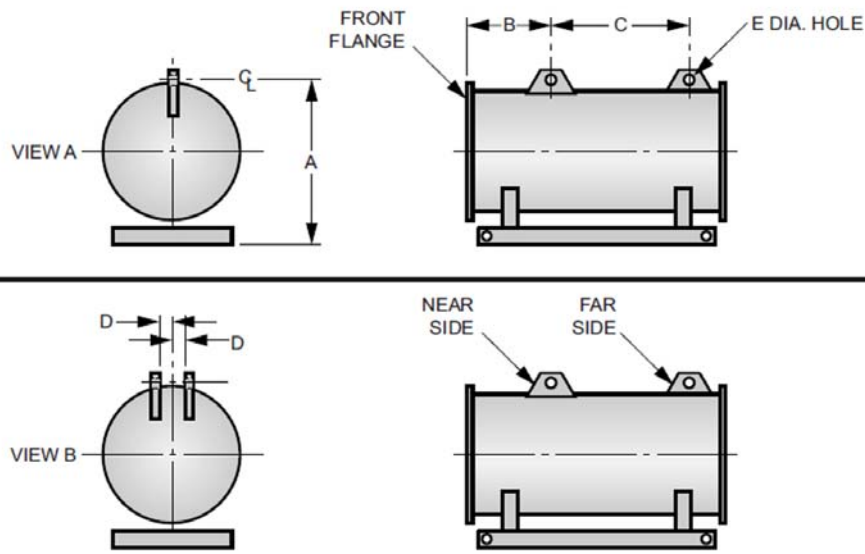
1. All numbers in table are in inches.
2. 6-inch high mounting piers recommended for use beneath the boiler base frame. The use of these piers provides increased inspection accessibility to the piping beneath the boiler and added height for washing down the area beneath the boiler.

Figure 9. Model CBLE Boiler Mounting Piers (96")

CBLE 250-350HP	
Motor HP	Hole Number
7.5	1
15	1
25	2
40	3

CBLE 400-800HP	
Motor HP	Hole Number
10	1
20	1
30	2
50	2
75	3

Figure 10. Front Davit Support



BOILER HP		VIEW	ALL DIMENSIONS IN INCHES				
			A	B	C	D	E
125	All	B	80-1/4	29-3/4	70-1/2	10	3
150	All	B	80-1/4	29-3/4	83-1/2	10	3
200	All	B	80-1/4	29-3/4	114-1/2	10	3
250	Steam	B	99	36	72	10	3
	Hot Water	B	99	36	81	10	3
300	Steam	B	99	36	99	10	3
	Hot Water	B	99	36	108	10	3
350	Steam	B	99	36	129	10	3
	Hot Water	B	99	36	138	10	3
400	Steam	B	119	35-3/4	78	11	3
	Hot Water	B	119	35-3/4	78	11	3
500	Steam	B	119	35-3/4	99	11	3
	Hot Water	B	119	35-3/4	99	11	3
600	Steam	B	119	35-3/4	131	11	3
	Hot Water	B	119	35-3/4	131	11	3
700 & 800	Steam	B	119	35-3/4	164	11	3
	Hot Water	B	119	35-3/4	164	11	3

NOTE: A, B and C dimensions may vary by 1/2 inch.

Figure 11. Lifting Lug Location, Model CBLE Boilers

PERFORMANCE DATA

The Low Emission Option provides NO_x reduction at current published and predicted fuel-to-steam efficiencies.

Specifying Boiler Efficiency

Cleaver-Brooks offers an industry leading fuel-to-steam boiler efficiency guarantee for Model CB-LE Firetube Boilers. The guarantee is based on the fuel-to-steam efficiencies shown in the efficiency tables and the following conditions. The efficiency percent number is only meaningful if the specific conditions of the efficiency calculations are clearly stated in the specification (see Cleaver-Brooks publication CB-7768 for a detailed description of efficiency calculations).

When specifying the efficiencies in the tables, be sure to include the specific guarantee conditions to maximize the effectiveness of your efficiency specification. If you have any questions regarding the efficiency specifications, please contact your local Cleaver-Brooks authorized representative.

Efficiency Specification

The boiler manufacturer shall guarantee that, at the time of startup, the boiler will achieve fuel-to-steam efficiency (see Tables 10 and 11) at 100% firing rate (add efficiency guarantees at 25%, 50%, and 75% of rating, if required). If the boiler(s) fail to achieve the corresponding guaranteed efficiency as published, the boiler manufacturer will rebate, to the ultimate boiler owner, ten thousand dollars (\$10,000) for every full efficiency point (1.0%) that the actual efficiency is below the guaranteed level.

The specified boiler efficiency is based on the following conditions.

1. Fuel specification used to determine boiler efficiency:

- Natural Gas

Carbon,% (wt) = 69.98

Hydrogen,% (wt) = 22.31

Sulfur,% (wt) = 0.0

Heating value, Btu/lb. = 21,830

- No. 2 Oil

Carbon,% (wt) = 85.8

Hydrogen,% (wt) = 12.7

Sulfur,% (wt) = 0.2

Heating value, Btu/lb. = 19,420

No. 6 Oil

Carbon,% (wt) = 86.6

Hydrogen,% (wt) = 10.9

Sulfur,% (wt) = 2.09

Heating value, Btu/lb. = 18,830

2. Efficiencies are based on ambient air temperature of 80 °F, relative humidity of 30%, and 15% excess air in the exhaust flue gas.
3. Efficiencies are based on manufacturer's published radiation and convection losses. (For Cleaver-Brooks radiation and convection losses, see Boiler Efficiency Facts Guide, publication number CB-7767).
4. Any efficiency verification testing will be based on the stack loss method.

For efficiencies and stack temperatures at operating pressures not listed, follow these procedures:

When the operating steam pressure is between 10 psig and 125 psig, interpolate the values from the efficiency tables.

When the operating steam pressure is above 125 psig, estimated efficiency can be calculated as follows:

Example:

Boiler: 350 hp.

Fuel: natural gas.

Operating steam pressure: 200 psig.

Find the fuel-to-steam efficiency at 100% firing rate. From Table 10 for a 350 hp boiler operating at 100% firing rate and an operating steam pressure of 125 psig, the efficiency is 82.5%.

Using Figure 12, note that the stack temperature increases 36 °F at the higher operating pressure. To estimate boiler efficiency, use this rule of thumb: For every 40 °F increase in stack temperature, efficiency decreases by 1%. Since the stack temperature rise is 36 °F, the decrease in the boiler efficiency at 200 psig operating pressure is calculated as follows: $36/40 = .9\%$. Therefore, the boiler efficiency at 200 psig operating pressure is $82.5 - .9 = 81.6\%$

Emissions

The emission data included in this section consists of typical emission levels for Model CB boilers equipped with 60, 30, 25, and 20 ppm LE Options when firing natural gas and No. 2 oil.

The data in Table 12 and Table 13 represent typical emission levels only. Guaranteed emission levels are available from your local Cleaver-Brooks authorized representative.

Table 10. Predicted Fuel-to-Steam Efficiencies - Natural Gas

BOILER HP	OPERATING PRESSURE = 10 psig				OPERATING PRESSURE = 125 psig			
	% OF LOAD				% OF LOAD			
	25%	50%	75%	100%	25%	50%	75%	100%
125	83.3	83.6	83.4	83.2	80.4	80.9	81.0	81.0
150	84.4	84.6	84.5	84.3	81.5	82.0	82.0	82.1
200	85.0	85.3	85.1	84.9	82.2	82.7	82.7	82.7
250	85.0	84.7	84.0	83.3	82.0	82.0	81.6	81.3
300	85.3	85.3	84.6	83.9	82.6	82.7	82.2	81.9
350	85.3	85.7	85.2	84.5	82.6	83.2	82.8	82.5
400	84.5	84.7	84.6	84.4	81.8	82.2	82.4	82.2
500	85.5	85.7	85.5	85.2	82.8	83.2	83.3	83.1
600	85.7	86.0	85.8	85.6	82.9	83.5	83.6	83.5
700	85.7	86.2	86.0	85.7	83.0	83.6	83.6	83.6
800	85.8	86.1	85.9	85.6	83.1	83.6	83.7	83.5

Table 11. Predicted Fuel-to-Steam Efficiencies - No. 2 Oil

BOILER HP	OPERATING PRESSURE = 10 psig				OPERATING PRESSURE = 125 psig			
	% OF LOAD				% OF LOAD			
	25%	50%	75%	100%	25%	50%	75%	100%
125	86.7	86.9	86.7	86.6	83.7	84.2	84.3	84.3
150	87.8	88.0	87.8	87.6	84.8	85.3	85.3	85.4
200	88.4	88.7	88.4	88.2	85.6	86.0	86.0	86.0
250	88.3	88.1	87.4	86.7	85.3	85.3	84.9	84.7
300	88.6	88.7	88.0	87.3	85.9	86.0	85.5	85.2
350	88.6	89.0	88.5	87.8	85.9	86.6	86.1	85.8
400	87.9	88.1	87.9	87.6	85.1	85.5	85.6	85.5
500	88.9	89.0	88.9	88.6	86.1	86.5	86.6	86.4
600	89.0	89.4	89.2	89.0	86.2	86.8	86.9	86.8
700	89.1	89.5	89.3	89.1	86.3	86.9	87.0	86.9
800	89.2	89.5	89.3	89.0	86.4	86.9	87.0	86.8

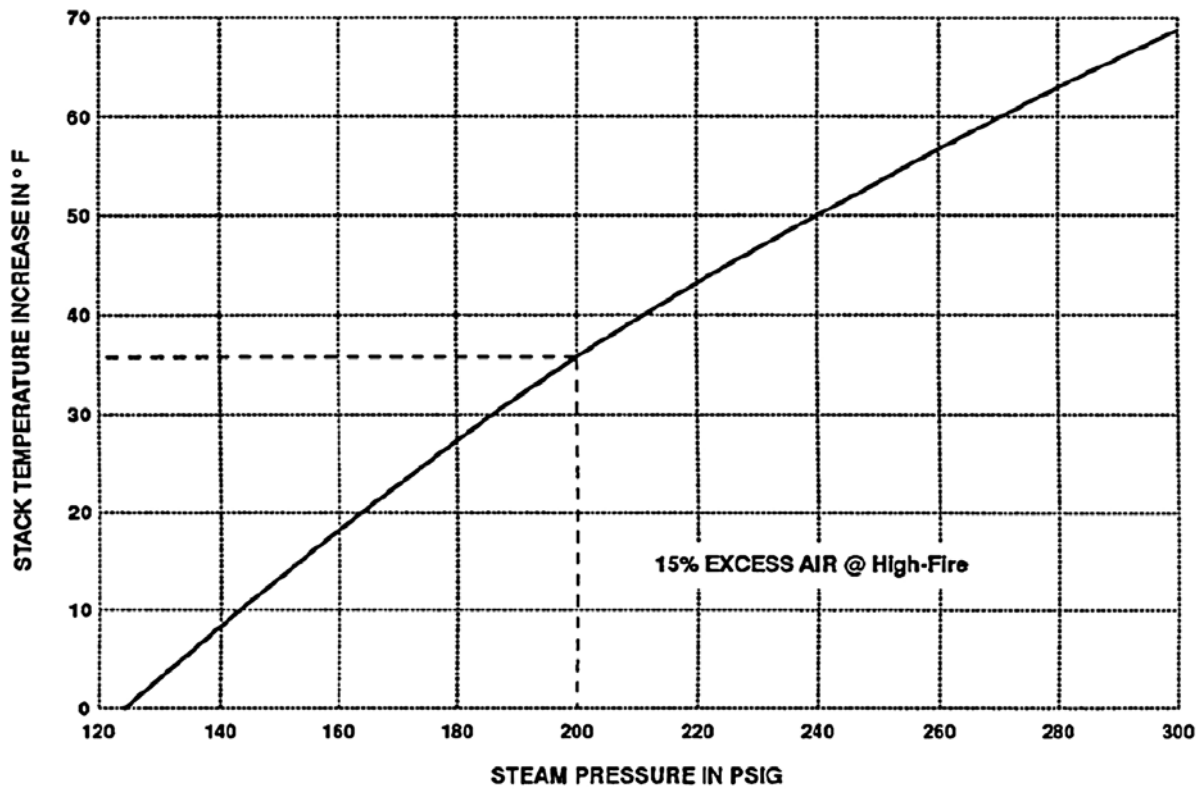


Figure 12. Predicted stack temperature increase for pressure > 125 psig

Table 12. CBLE Boilers - Natural Gas, Emission Levels

POLLUTANT		ESTIMATED LEVEL				
		60 ppm	30 ppm	20 ppm	15 ppm	9 ppm
CO	ppm ^A lb./MMBtu	50/150 ^B 0.04/0.11	50/150 ^B 0.04/0.11	50/150 ^B 0.04/0.11	50 0.04	50 0.04
NOx	ppm ^A lb/MMBtu	60 0.07	30 0.035	20 0.024	15 0.018	9 0.011
SOx	ppm ^A lb/MMBtu	1 0.001	1 0.001	1 0.001	1 0.001	1 0.001
HC/VOC ₅	ppm ^A lb/MMBtu	10 0.004	10 0.004	10 0.004	10 0.004	10 0.004
PM	ppm ^A lb/MMBtu	- 0.01	- 0.01	- 0.01	- 0.01	- 0.01

A. ppm levels are given on a dry volume basis and corrected to 3% oxygen (15% excess air).
 B. CO emission for 60, 30, 25 & 20 ppm system is 50 ppm (0.04 lb/MMBtu) when boiler is operating above 50% of rated capacity.
 CO emission is 150 ppm (0.11 lb/MMBtu) when boiler is operating below 50% of rated capacity.

Table 13. CBLE Boilers - No. 2 Oil, Emission Levels

POLLUTANT		ESTIMATED LEVEL			
		60 ppm LE Option	30, 20 ppm LE Option	15 ppm	9 ppm
CO	ppm ^A lb/MMBtu	50 0.039	50 0.039	50 0.039	50 0.039
NOx	ppm ^A lb/MMBtu	140 0.186	90 0.120	85 0.113	70 0.093
SOx	ppm ^A lb/MMBtu	278 0.52	278 0.52	278 0.52	278 0.52
HC/VOCs	ppm ^A lb/MMBtu	4 0.002	4 0.002	4 0.002	4 0.002
PM	ppm ^A lb/MMBtu	- 0.025	- 0.025	- 0.025	- 0.025

A. ppm levels are given on a dry volume basis and corrected to 3% oxygen (15% excess air).
 BASED ON THE FOLLOWING CONSTITUENT LEVELS:
 Fuel-bound Nitrogen content = 0.015% by weight.
 Sulfur content = 0.5% by weight.
 Ash content = 0.01% by weight.

ENGINEERING DATA

Sound Level

Table 14 gives a summary of predicted sound pressure levels for Model CB boilers with 30 ppm LE Options. Contact your local Cleaver-Brooks authorized representative for sound levels or other LE Options.

Units - The units for the sound level tables are dbA (decibels, measured on the A-weighted scale) in reference to 0.0002 microbars (20 micro-Newtons per square meter). Their reference are standardly used in specifying and reporting sound pressure levels on industrial equipment.

Test Method - The sound pressure levels in the above tables were obtained from tests in accordance with the "ABMA Test Code for the Measurement of Sound from Packaged Boilers". In accordance with this code the sound pressure levels reported were measured on the boiler centerline 4-1/2 feet vertically above the bottom of the base rails and 3 feet horizontally in front of the end of the blower

motor or front surface of the electrical cabinet.

Sound Level Meter - The sound level meter used complies with ANSI S1.4, Type 1 (Precision). The readings are taken with the meter set for slow response and corrected for background levels.

Sound Pressure - The large size boilers, the need for auxiliary equipment, and the necessary interconnecting piping make it impractical (and sometimes impossible) to provide a boiler testing environment which is suitable for taking the data needed to develop Sound Pressure Power levels.

Typical Values - Sound pressure levels (dba) for the same boiler will vary between boiler rooms. Sound levels will vary with motor type, NOx levels, and altitudes. In addition, variations will occur between different people using different sound meters on the same boiler. And finally, no two boilers can be expected to give precisely the same sound levels. For these reasons, we can only predict, but not guarantee, sound levels (dba).

Table 14. CBLE Predicted Sound Levels 30 ppm NOx Systems

BOILER HP	125	150	200	250	300	350	400	500	600	700	800
HFO, dbA	84	84	84	83	84	85	84	85	85	88	90
LFO, dbA	82	82	83	81	82	83	82	83	83	84	89
HFG, dbA	82	82	83	82	83	84	83	83	85	87	90
LFG, dbA	81	81	82	81	82	83	81	81	82	84	88

NOTES

1. Sound pressure levels measured on boilers operating in various locations and expressed in dbA are as shown:
2. Based on standard altitude fans and fan motors, 60 Hz.
3. Contact your local Cleaver-Brooks authorized representative for sound levels of 60 or 20 ppm LE Options.

ABBREVIATIONS:

- HF = High Fire
- LF = Low Fire
- O = Oil
- G = Gas

Table 15. Standard, Undersize, and Oversize Gas Trains

CBLE									
BOILER HP	GAS TRAIN SIZE	UPSTREAM VALVE*	DOWNSTREAM VALVE*	EMISSIONS LEVEL					
				09 ppm	15 ppm	20 ppm	30 ppm	60 ppm	UC
125 HP	1.5 in	BB	BB	3.3 - 4.9 psi	3.3 - 4.9 psi	0.8 - 5.0 psi	0.7 - 5.0 psi	0.7 - 5.0 psi	0.7 - 5.0 psi
125 HP	1.5 in	PC	PC	3.4 - 5.0 psi	3.4 - 5.0 psi	0.9 - 5.0 psi	0.8 - 5.0 psi	0.8 - 5.0 psi	0.8 - 5.0 psi
125 HP	2.0 in	BB	BB	3.1 - 3.3 psi	3.1 - 3.3 psi	0.6 - 0.8 psi	0.6 - 0.7 psi	0.5 - 0.7 psi	0.5 - 0.7 psi
125 HP	2.0 in	PC	PC	3.1 - 3.4 psi	3.1 - 3.4 psi	0.6 - 0.9 psi	0.6 - 0.8 psi	0.6 - 0.8 psi	0.5 - 0.8 psi
125 HP	2.5 in	PC	PC	3.0 - 3.1 psi	3.0 - 3.1 psi	0.4 - 0.6 psi	0.4 - 0.6 psi	0.4 - 0.5 psi	0.4 - 0.5 psi
125 HP	3.0 in	PC	PC	2.9 - 3.0 psi	2.9 - 3.0 psi	0.4 - 0.4 psi	0.4 - 0.4 psi	0.4 - 0.4 psi	0.3 - 0.4 psi
125 HP	4.0 in	PC	PC	2.9 - 2.9 psi	2.9 - 2.9 psi	0.4 - 0.4 psi	0.3 - 0.4 psi	0.3 - 0.4 psi	0.3 - 0.3 psi
150 HP	1.5 in	BB	BB	3.7 - 5.5 psi	3.9 - 5.8 psi	1.0 - 4.7 psi	0.9 - 5.0 psi	0.9 - 5.0 psi	0.9 - 5.0 psi
150 HP	1.5 in	PC	PC	3.8 - 5.7 psi	4.0 - 6.0 psi	1.1 - 4.2 psi	1.1 - 5.0 psi	1.0 - 5.0 psi	1.0 - 5.0 psi
150 HP	2.0 in	BB	BB	3.4 - 3.7 psi	3.6 - 3.9 psi	0.7 - 1.0 psi	0.6 - 0.9 psi	0.6 - 0.9 psi	0.6 - 0.9 psi
150 HP	2.0 in	PC	PC	3.4 - 3.8 psi	3.6 - 4.0 psi	0.7 - 1.1 psi	0.7 - 1.1 psi	0.7 - 1.0 psi	0.6 - 1.0 psi
150 HP	2.5 in	PC	PC	3.2 - 3.4 psi	3.4 - 3.6 psi	0.5 - 0.7 psi	0.4 - 0.6 psi	0.4 - 0.6 psi	0.4 - 0.6 psi
150 HP	3.0 in	PC	PC	3.2 - 3.2 psi	3.4 - 3.4 psi	0.4 - 0.5 psi	0.4 - 0.4 psi	0.4 - 0.4 psi	0.3 - 0.4 psi
150 HP	4.0 in	PC	PC	3.1 - 3.2 psi	3.3 - 3.4 psi	0.4 - 0.4 psi	0.3 - 0.4 psi	0.3 - 0.4 psi	0.3 - 0.3 psi
200 HP	1.5 in	BB	BB	4.6 - 6.9 psi	5.0 - 7.5 psi		1.6 - 5.0 psi	1.5 - 5.0 psi	1.5 - 5.0 psi
200 HP	1.5 in	PC	PC	4.8 - 7.2 psi	5.2 - 7.8 psi		1.8 - 5.0 psi	1.7 - 5.0 psi	1.7 - 5.0 psi

Table 15. Standard, Undersize, and Oversize Gas Trains (Continued)

CBLE									
BOILER HP	GAS TRAIN SIZE	UPSTREAM VALVE*	DOWNSTREAM VALVE*	EMISSIONS LEVEL					
				09 ppm	15 ppm	20 ppm	30 ppm	60 ppm	UC
200 HP	2.0 in	BB	BB	4.1 - 4.6 psi	4.5 - 5.0 psi		1.0 - 1.6 psi	1.0 - 1.5 psi	1.0 - 1.5 psi
200 HP	2.0 in	PC	PC	4.1 - 4.8 psi	4.5 - 5.2 psi		1.1 - 1.8 psi	1.1 - 1.7 psi	1.0 - 1.7 psi
200 HP	2.5 in	PC	PC	3.8 - 4.1 psi	4.2 - 4.5 psi		0.7 - 1.0 psi	0.7 - 1.0 psi	0.6 - 1.0 psi
200 HP	3.0 in	PC	PC	3.6 - 3.8 psi	4.0 - 4.2 psi		0.6 - 0.7 psi	0.5 - 0.7 psi	0.5 - 0.6 psi
200 HP	4.0 in	PC	PC	3.6 - 3.6 psi	4.0 - 4.0 psi		0.5 - 0.6 psi	0.5 - 0.5 psi	0.4 - 0.5 psi
250 HP	1.5 in	BB	BB	4.1 - 6.2 psi	4.4 - 6.7 psi	2.4 - 5.0 psi	2.4 - 2.7 psi	2.4 - 2.6 psi	2.3 - 2.6 psi
250 HP	1.5 in	PC	PC	4.5 - 6.7 psi	4.8 - 7.2 psi	2.8 - 5.0 psi	2.7 - 2.8 psi	2.7 - 2.7 psi	2.7 - 2.7 psi
250 HP	2.0 in	BB	BB	3.3 - 3.8 psi	3.7 - 4.1 psi	1.6 - 2.4 psi	1.6 - 2.4 psi	1.6 - 2.4 psi	1.5 - 2.3 psi
250 HP	2.0 in	PC	PC	3.4 - 4.0 psi	3.7 - 4.3 psi	1.7 - 2.8 psi	1.7 - 2.7 psi	1.6 - 2.7 psi	1.6 - 2.7 psi
250 HP	2.5 in	PC	PC	2.9 - 3.3 psi	3.2 - 3.7 psi	1.1 - 1.6 psi	1.1 - 1.6 psi	1.1 - 1.6 psi	1.0 - 1.5 psi
250 HP	3.0 in	PC	PC	2.7 - 2.9 psi	3.1 - 3.2 psi	0.9 - 1.1 psi	0.9 - 1.1 psi	0.9 - 1.1 psi	0.9 - 1.0 psi
250 HP	4.0 in	PC	PC	2.6 - 2.7 psi	2.9 - 3.1 psi	0.8 - 0.9 psi	0.8 - 0.9 psi	0.8 - 0.9 psi	0.8 - 0.9 psi
300 HP	1.5 in - 2.0 in	BB	BB	5.5 - 8.3 psi	5.7 - 8.5 psi	3.0 - 5.0 psi	3.0 - 3.6 psi	3.0 - 3.5 psi	3.0 - 3.5 psi
300 HP	1.5 in - 2.0 in	PC	PC	5.8 - 8.7 psi	6.0 - 9.0 psi	3.3 - 5.0 psi	3.3 - 3.7 psi	3.3 - 3.6 psi	3.3 - 3.6 psi
300 HP	2.0 in	BB	BB	4.6 - 5.5 psi	4.7 - 5.7 psi	2.1 - 3.0 psi	2.1 - 3.0 psi	2.0 - 3.0 psi	2.0 - 3.0 psi
300 HP	2.0 in	PC	PC	4.7 - 5.8 psi	4.8 - 6.0 psi	2.2 - 3.3 psi	2.2 - 3.3 psi	2.1 - 3.3 psi	2.1 - 3.3 psi
300 HP	3.0 in	PC	PC	3.9 - 4.6 psi	4.0 - 4.7 psi	1.3 - 2.1 psi	1.3 - 2.1 psi	1.2 - 2.0 psi	1.2 - 2.0 psi
300 HP	4.0 in	PC	PC	3.7 - 3.9 psi	3.9 - 4.0 psi	1.1 - 1.3 psi	1.1 - 1.3 psi	1.0 - 1.2 psi	1.0 - 1.2 psi
350 HP	1.5 in - 2.0 in	BB	BB	6.4 - 9.0 psi	6.2 - 9.0 psi	4.2 - 5.0 psi	4.2 - 5.0 psi	4.1 - 5.0 psi	4.1 - 5.0 psi
350 HP	1.5 in - 2.0 in	PC	PC	6.8 - 9.0 psi	6.6 - 9.0 psi	4.6 - 5.0 psi	4.6 - 5.0 psi	4.5 - 5.0 psi	4.5 - 5.0 psi
350 HP	2.0 in	BB	BB	5.4 - 6.4 psi	5.3 - 6.2 psi	3.2 - 4.2 psi	3.2 - 4.2 psi	3.2 - 4.1 psi	3.1 - 4.1 psi
350 HP	2.0 in	PC	PC	5.6 - 6.8 psi	5.4 - 6.6 psi	3.4 - 4.6 psi	3.4 - 4.6 psi	3.3 - 4.5 psi	3.3 - 4.5 psi
350 HP	2.5 in	PC	PC	4.3 - 5.4 psi	4.2 - 5.3 psi	2.1 - 3.2 psi	2.1 - 3.2 psi	2.0 - 3.2 psi	2.0 - 3.1 psi
350 HP	3.0 in	PC	PC	4.0 - 4.3 psi	3.8 - 4.2 psi	1.7 - 2.1 psi	1.7 - 2.1 psi	1.7 - 2.0 psi	1.6 - 2.0 psi
350 HP	4.0 in	PC	PC	3.7 - 4.0 psi	3.6 - 3.8 psi	1.5 - 1.7 psi	1.5 - 1.7 psi	1.4 - 1.7 psi	1.4 - 1.6 psi
400 HP	1.5 in - 2.0 in	BB	BB	6.9 - 9.0 psi	6.9 - 9.0 psi	4.6 - 5.0 psi	4.6 - 5.0 psi	4.5 - 5.0 psi	4.5 - 5.0 psi
400 HP	1.5 in - 2.0 in	PC	PC	7.4 - 9.0 psi	7.5 - 9.0 psi	5.1 - 8.7 psi	5.1 - 7.7 psi	5.1 - 7.7 psi	5.1 - 7.7 psi
400 HP	2.0 in	BB	BB	5.5 - 6.9 psi	5.6 - 6.9 psi	3.2 - 4.6 psi	3.2 - 4.6 psi	3.2 - 4.5 psi	3.2 - 4.5 psi
400 HP	2.0 in	PC	PC	5.7 - 7.4 psi	5.8 - 7.5 psi	3.4 - 5.0 psi	3.4 - 5.0 psi	3.4 - 5.0 psi	3.4 - 5.0 psi
400 HP	2.5 in	PC	PC	4.1 - 5.5 psi	4.2 - 5.6 psi	1.8 - 3.2 psi	1.8 - 3.2 psi	1.8 - 3.2 psi	1.8 - 3.2 psi
400 HP	3.0 in	PC	PC	3.7 - 4.1 psi	3.8 - 4.2 psi	1.3 - 1.8 psi	1.3 - 1.8 psi	1.3 - 1.8 psi	1.3 - 1.8 psi
400 HP	4.0 in	PC	PC	3.4 - 3.7 psi	3.5 - 3.8 psi	1.1 - 1.3 psi	1.0 - 1.3 psi	1.0 - 1.3 psi	1.0 - 1.3 psi
500 HP	2.0 in - 2.5 in	BB	PC	5.8 - 7.6 psi	5.8 - 7.6 psi	4.6 - 5.0 psi	4.6 - 5.0 psi	4.5 - 5.0 psi	4.5 - 5.0 psi
500 HP	2.0 in - 2.5 in	PC	PC	6.0 - 8.3 psi	6.0 - 8.3 psi	4.8 - 5.0 psi	4.7 - 5.0 psi	4.7 - 5.0 psi	4.7 - 5.0 psi
500 HP	2.5 in	PC	PC	3.9 - 5.8 psi	3.9 - 5.8 psi	2.7 - 4.6 psi	2.7 - 4.6 psi	2.7 - 4.5 psi	2.6 - 4.5 psi
500 HP	3.0 in	PC	PC	3.3 - 3.9 psi	3.3 - 3.9 psi	2.0 - 2.7 psi	2.0 - 2.7 psi	2.0 - 2.7 psi	2.0 - 2.6 psi
500 HP	4.0 in	PC	PC	2.8 - 3.3 psi	2.8 - 3.3 psi	1.6 - 2.0 psi	1.6 - 2.0 psi	1.5 - 2.0 psi	1.5 - 2.0 psi
600 HP	2.0 in - 2.5 in	BB	PC	8.0 - 9.0 psi	8.0 - 9.0 psi	6.5 - 9.0 psi	6.5 - 9.0 psi	6.4 - 8.9 psi	6.3 - 8.8 psi
600 HP	2.0 in - 2.5 in	PC	PC	8.2 - 9.0 psi	8.2 - 9.0 psi	6.7 - 10.0 psi	6.7 - 10.0 psi	6.6 - 9.9 psi	6.6 - 9.9 psi
600 HP	2.5 in	PC	PC	5.4 - 8.0 psi	5.4 - 8.0 psi	3.9 - 5.0 psi	3.8 - 5.0 psi	3.8 - 5.0 psi	3.7 - 5.0 psi
600 HP	2.5 in - 3.0 in	PC	PC	5.2 - 5.4 psi	5.2 - 5.4 psi	3.7 - 3.9 psi	3.6 - 3.8 psi	3.5 - 3.8 psi	3.5 - 3.7 psi
600 HP	3.0 in	PC	PC	4.3 - 5.2 psi	4.3 - 5.2 psi	2.8 - 3.7 psi	2.7 - 3.6 psi	2.7 - 3.5 psi	2.6 - 3.5 psi
600 HP	4.0 in	PC	PC	3.7 - 4.3 psi	3.7 - 4.3 psi	2.2 - 2.8 psi	2.1 - 2.7 psi	2.0 - 2.7 psi	2.0 - 2.6 psi
700 HP	2.0 in - 3.0 in	BB	PC	11.0 - 15.0 psi	10.7 - 15.0 psi	8.7 - 13.1 psi	8.6 - 13.0 psi	8.6 - 12.9 psi	8.6 - 12.8 psi
700 HP	2.0 in - 3.0 in	PC	PC	11.3 - 15.0 psi	11.0 - 15.0 psi	9.0 - 13.5 psi	8.9 - 13.4 psi	8.9 - 13.4 psi	8.9 - 13.3 psi
700 HP	2.5 in - 3.0 in	PC	PC	7.1 - 9.0 psi	6.8 - 9.0 psi	4.8 - 5.0 psi	4.7 - 5.0 psi	4.7 - 5.0 psi	4.6 - 5.0 psi
700 HP	3.0 in	PC	PC	6.0 - 7.1 psi	5.7 - 6.8 psi	3.6 - 4.8 psi	3.6 - 4.7 psi	3.5 - 4.7 psi	3.5 - 4.6 psi
700 HP	4.0 in	PC	PC	5.1 - 6.0 psi	4.8 - 5.7 psi	2.8 - 3.6 psi	2.7 - 3.6 psi	2.7 - 3.5 psi	2.6 - 3.5 psi
800 HP	2.0 in - 3.0 in	BB	PC				10.8 - 15.0 psi	10.7 - 15.0 psi	10.6 - 15.0 psi
800 HP	2.0 in - 3.0 in	PC	PC				11.2 - 15.0 psi	11.1 - 15.0 psi	11.0 - 15.0 psi

Table 15. Standard, Undersize, and Oversize Gas Trains (Continued)

CBLE									
BOILER HP	GAS TRAIN SIZE	UPSTREAM VALVE*	DOWNSTREAM VALVE*	EMISSIONS LEVEL					
				09 ppm	15 ppm	20 ppm	30 ppm	60 ppm	UC
800 HP	2.5 in - 3.0 in	PC	PC				6.1 - 9.0 psi	6.0 - 10.0 psi	5.9 - 10.0 psi
800 HP	3.0 in	PC	PC				4.8 - 6.1 psi	4.7 - 5.0 psi	4.6 - 5.0 psi
800 HP	4.0 in	PC	PC				3.5 - 4.8 psi	3.4 - 4.7 psi	3.4 - 4.6 psi

* BB = Butter Ball; PC = Plug Cock

Standard Gas Train size is highlighted

NOTE: In cases where the gas train increases in size after the regulating valve, two diameters are listed. The first number is the customer connection size.

Table 16. Minimum required regulated gas pressure altitude conversion

ALTITUDE (FT)	CORRECTION FACTOR	ALTITUDE (FT)	CORRECTION FACTOR
1000	1.04	6000	1.25
2000	1.07	7000	1.30
3000	1.11	8000	1.35
4000	1.16	9000	1.40
5000	1.21	-	-

To obtain minimum required gas pressure at altitudes above 700 feet, multiply the pressure by the listed factors:
 Inches WC x 0.577 = oz/sq-in.
 Oz/sq-in x 1.732 = Inches WC
 Inches WC x 0.0361 = psig.
 Oz/sq-in x 0.0625 = psig.
 Psig x 27.71 = Inches WC
 Psig x 16.0 = Oz/sq-in.

Table 17. Maximum Gas Consumption (CFH) for Natural Gas and Propane Vapor

BOILER HP	TYPE OF GAS AND HEAT CONTENT	
	NATURAL GAS 1000 (Btu/cu-ft)	PROPANE GAS 2550 (Btu/cu-ft)
125	5103	2000
150	6124	2402
200	8165	3202
250	10206	4002
300	12247	4802
350	14280	5600
400	16329	6404
500	20415	8006
600	24494	9605
700	28576	11206
800	32659	12807

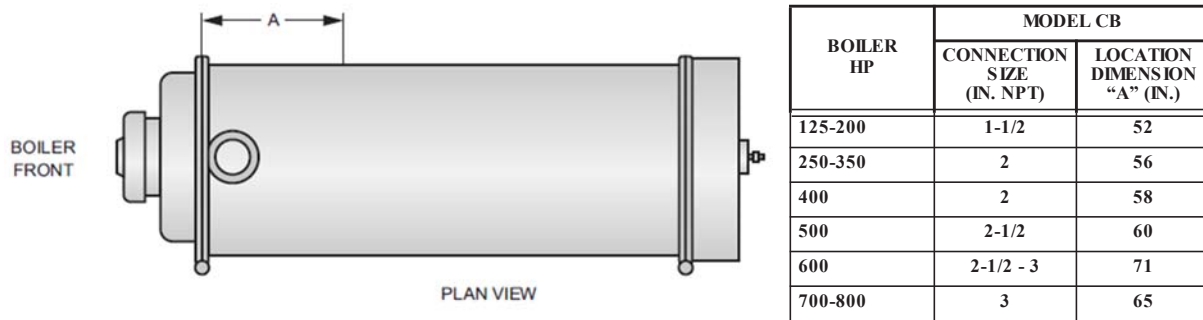


Figure 13. Standard Gas Train Connection Size and Location

Stack Support Capabilities

All standard Cleaver-Brooks Firetube Boilers with an LE option can support up to 2,000 lbs without additional support.

LE Boilers 250 hp through 800 hp can be reinforced to support 3,000 lbs.

Stack/Breeching Size Criteria

The design of the stack and breeching must provide the required draft at each boiler flue gas outlet. Proper draft is critical to burner performance.

Although constant pressure at the flue gas outlet of the Model CB-LE is not required, it is necessary to size the stack/breeching to limit flue gas pressure variation. The allowable pressure range is $-0.25''$ W.C. to $+0.25''$ W.C.

For additional information, please review Section I4, General Engineering Data (Stacks) and Section F, Stacks. Stack and breeching sizes should always be provided by a reputable stack supplier who will design the stack and breeching system based on the above criteria. Your local Cleaver-Brooks authorized representative is capable of assisting in your evaluation of the stack/breeching design.

Boiler Room Combustion Air

When determining boiler room air requirements, the size of the room, air flow, and velocity of air must be reviewed as follows:

1. Size (area) and location of air supply openings in boiler room.
 - A. Two (2) permanent air supply openings in the outer walls of the boiler room are recommended. Locate (1) at each end of the boiler room, preferably below a height of 7 feet. This allows air to sweep the length of the boiler.
 - B. Air supply openings can be louvered for weather protection, but they should not be covered with fine mesh wire, as this type of covering has poor air flow qualities and is subject to clogging by dust or dirt.
 - C. A vent fan in the boiler room is not recommended, as it could create a slight vacuum under certain conditions and cause variations in the quantity of combustion air. This can result in unsatisfactory burner performance.
 - D. Under no condition should the total area of the air supply openings be less than (1) square foot.
 - E. Size the openings by using the formula:
Area (sq-ft) = CFM/FPM

2. Amount of air required (cfm).
 - A. Combustion Air = Rated bhp x 8 cfm/bhp.
 - B. Ventilation Air = Maximum bhp x 2 cfm/bhp
 - C. Total recommended air = 10 cfm/bhp - up to 1000 feet elevation. Add 3 percent more per 1000 feet of added elevation.
3. Acceptable air velocity in Boiler Room (fpm).
 - A. From floor to (7) foot height - 250 fpm
 - B. Above (7) foot height - 500 fpm

Example: Determine the area of the boiler room air supply openings for (1) 300 hp boiler at 800 feet altitude. The air openings are to be 5 feet above floor level.

- Air required: $300 \times 10 = 3000$ cfm (from 2B above).
- Air velocity: Up to 7 feet = 250 fpm (from 3 above).
- Area Required: $\text{Area} = \text{cfm} / \text{velocity} = 3000 / 250 = 12$ sq-ft total.
- Area/Opening: $12 / 2 = 6$ sq-ft/opening (2 required).

Consult local codes, which may supersede these requirements.

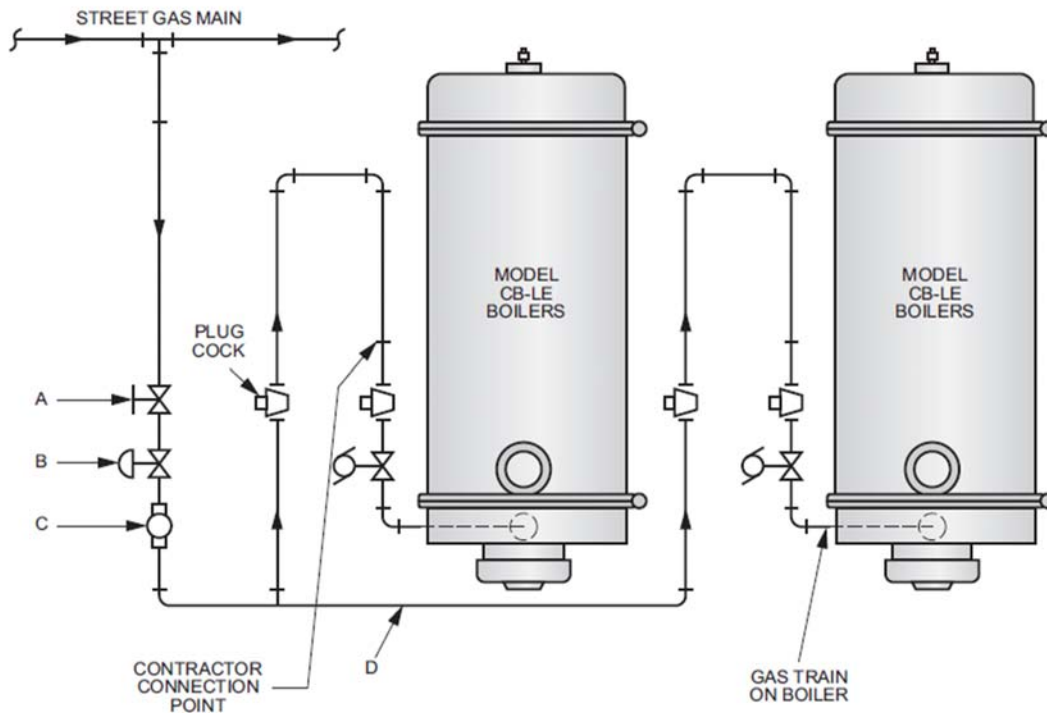


Figure 14. Typical Gas Piping Layout

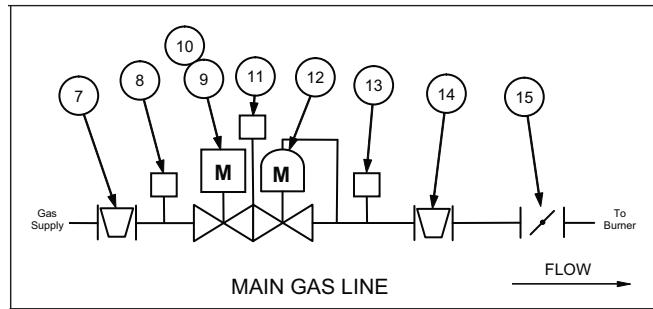
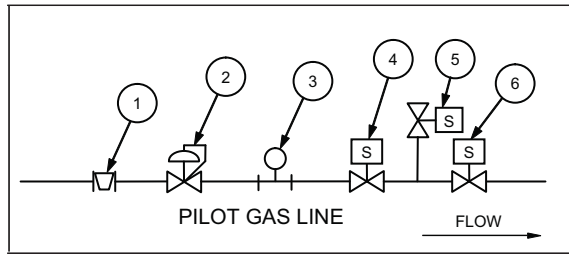
This figure illustrates the basic gas valve arrangement on Cleaver-Brooks Model CB boiler and shows the contractor's connection point. The valves and controls between the contractor connection point and the gas main in the street are representative of a typical installation. Actual requirements may vary depending on local codes or local gas company requirements which should be investigated prior to preparation of specifications and prior to construction.

- A. Utilities service valve.
- B. Utilities service regulator.
- C. Gas meter.
- D. Piping from meter to boiler.

The size of the gas line from the meter to the gas pressure regulator at the boiler can be very important if gas pressures are marginal. The gas line sizing is dependent on:

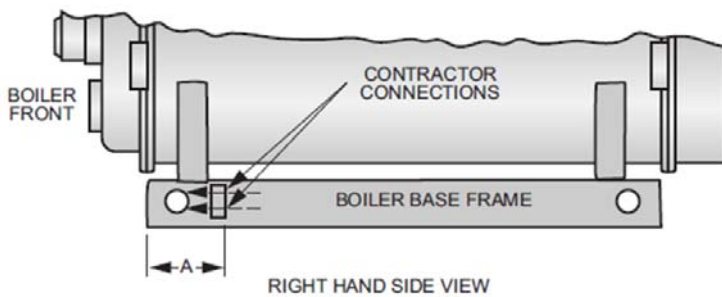
1. Gas pressure at outlet of gas meter (C)
2. Rate of gas flow required, CFH
3. Length of pipe run (D)
4. Pressure required at contractor connection point.

The local gas utility will advise the pressure that is available at the outlet of their meter.



ITEM	DESCRIPTION	UL		FM		CSD-1	NFPA-85
		125 hp - 300 hp	350 hp - 800 hp	125 hp - 300 hp	350 hp - 800 hp	125 hp - 300 hp	350 hp - 800 hp
1	Pilot Shut Off Cock	X	X	X	X	X	X
2	Pilot Pressure Regulator	X	X	X	X	X	X
3	Pilot Pressure Gauge	X	X	X	X	X	X
4	Gas Pilot Valve	X	X	X	X	X	X
5	Pilot Vent Valve						X
6	Gas Pilot Valve						X
7	Manual Shut Off Valve	X	X	X	X	X	X
8	Low Gas Pressure Switch	X	X	X	X	X	X
9	Main Gas Valve w/o POC	X	X	X		X	
10	Main Gas Valve w/ POC				X		X
11	Vent Valve or Valve Proving Switch		X		X		X
12	Regulating Gas Valve w/ POC	X	X	X	X	X	X
13	High Gas Pressure Switch	X	X	X	X	X	X
14	Manual Shut Off Valve	X	X	X	X	X	X
15	Butterfly Valve	X	X	X	X	X	X

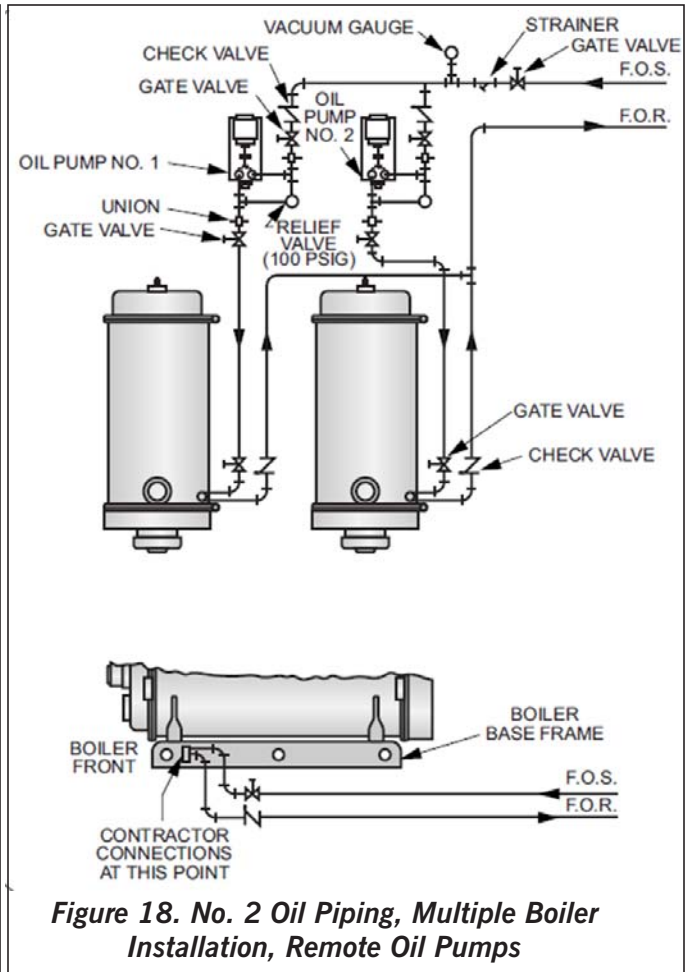
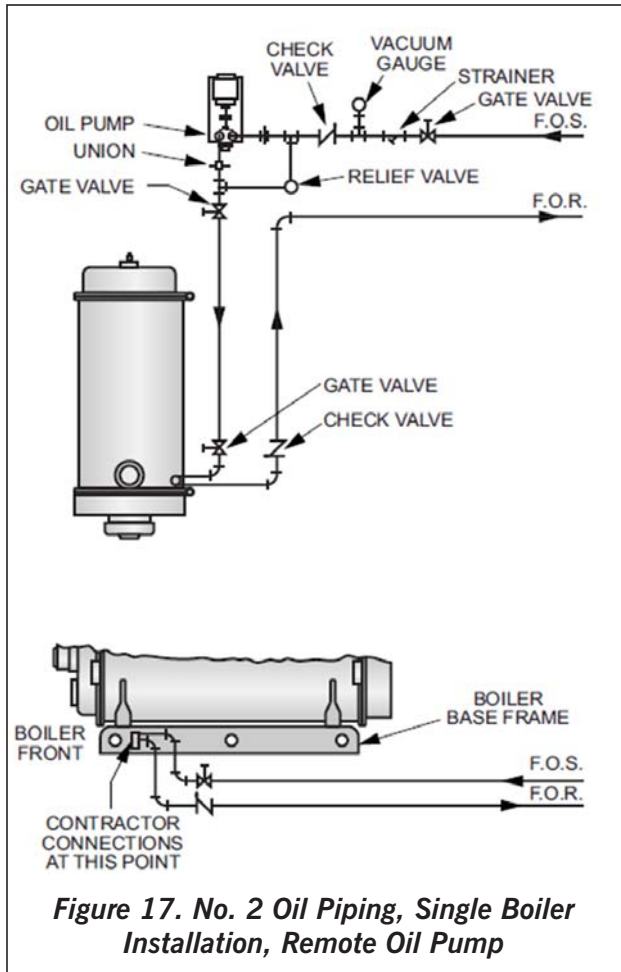
Figure 15. Model CBLE Gas Train Components

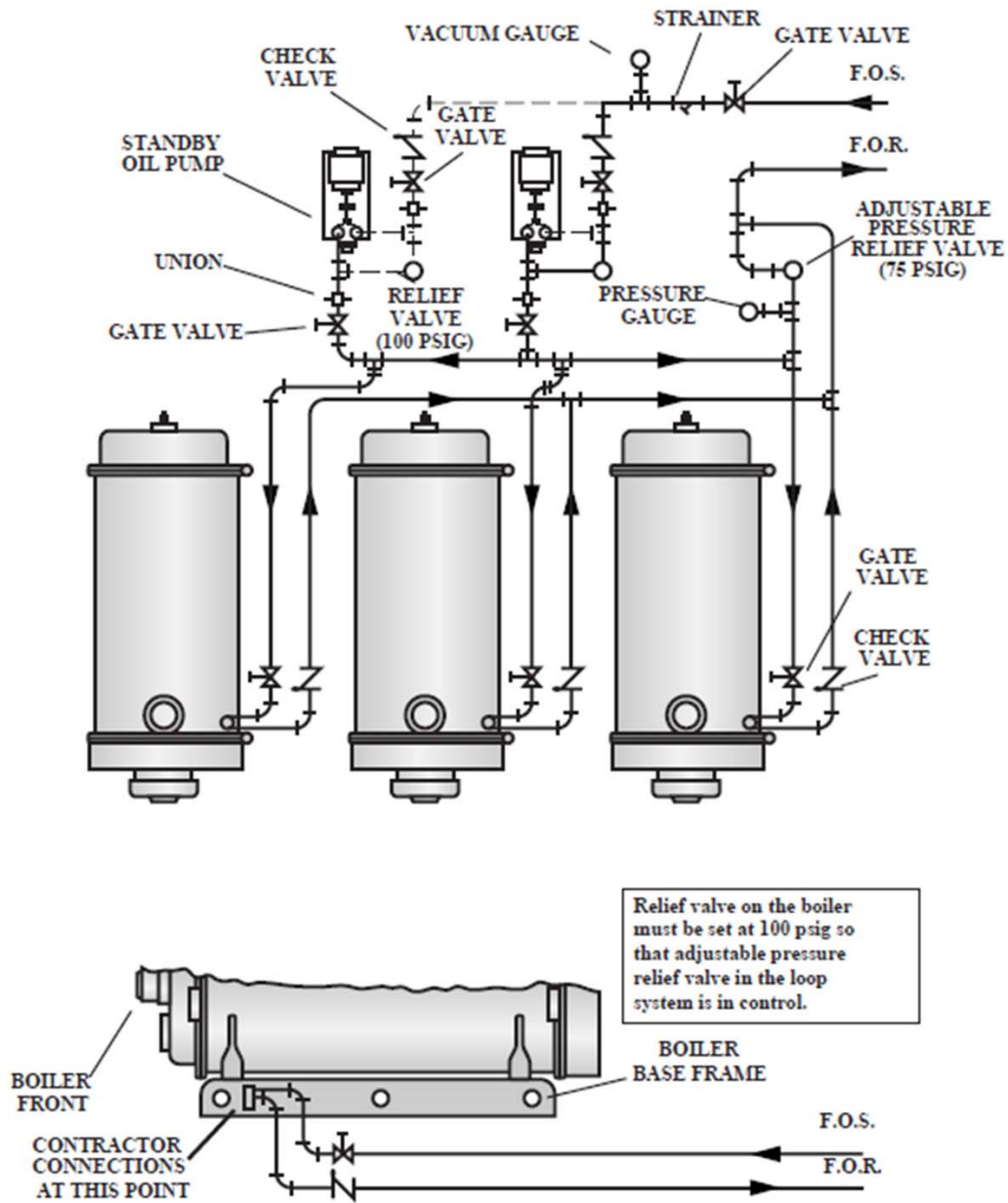


BOILER HP	SUPPLY AND RETURN CONN SIZES (IN. NPT)	A (IN.)	RECOMMENDED OIL LINE ^A SIZES (STANDARD PIPE) (IN. - IPS)		
			STORAGE TANK TO BOILER OR PUMP CONNECT	PUMP TO BOILER	RETURN LINE TO TANK
125 150 200	3/4	12-1/2	1	1	1
250 300 350	3/4	34	1	1	1
400 500 600	3/4	11-3/4	1	1	1
700 800	1	11-3/4	1	1	1

NOTE: See No. 2 Oil Line Sizing Instruction for systems with other conditions.
 A. For suction line condition with a maximum of 10 ft of lift and a total of 100 ft of suction line.

Figure 16. No.2 Oil Connection Size, Location, and Recommended Line Sizes





Relief valve on the boiler must be set at 100 psig so that adjustable pressure relief valve in the loop system is in control.

Figure 19. No. 2 Oil Piping, Multiple Boiler Installation

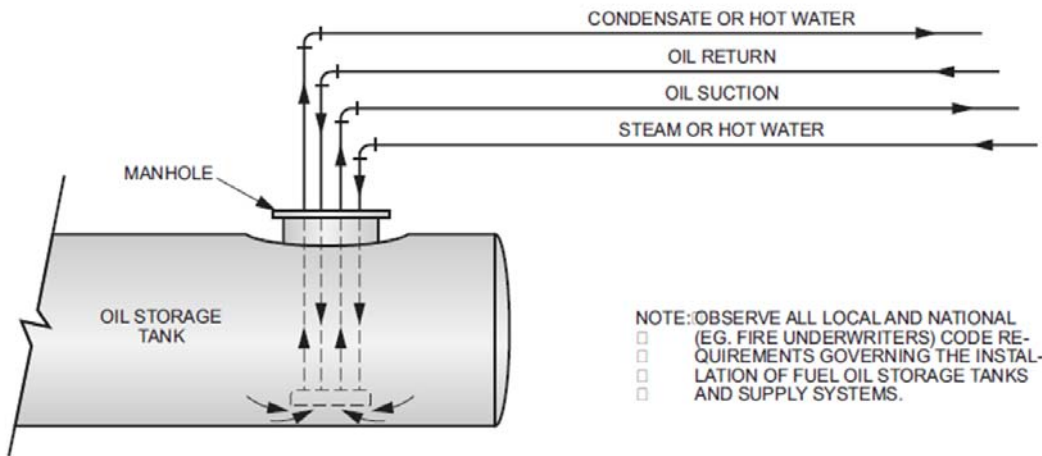


Figure 20. No. 2 Oil Piping Typical Arrangement

Table 18. Blowdown Tank Sizing

BOILER HP	WATER (GAL)
125	97
150	118
200	145
250	146
300	176
350	210
400	177
500	209
600	250
700, 800	296

NOTE: Quantity of water removed from boiler by lowering normal water line 4".

Table 19. Heating Surface

BOILER HP	HEATING SURFACE (SQ-FT)	
	FIRESIDE	WATERSIDE
125	625	679
150	750	820
200	1000	1092
250	1250	1346
300	1500	1623
350	1750	1932
400	2000	2151
500	2500	2691
600	3000	3262
700, 800	3500	3810

Table 20. Steam Volume and Disengaging Area

BOILER HP	STEAM VOLUME CU-FT		STEAM DISENGAGING AREA SQ-IN	
	HIGH PRESSURE ^A	LOW PRESSURE ^B	HIGH PRESSURE ^A	LOW PRESSURE ^B
125	25.4	36.6	5371	5887
150	30.7	44.3	6511	7138
200	37.7	54.4	7985	8752
250	49.2	70.6	7980	8695
300	59.5	85.3	9651	10516
350	70.9	101.7	11507	12538
400	72.1	97.9	9793	10593
500	83.7	113.7	11376	12303
600	101.5	137.8	13787	14911
700-800	119.8	162.7	16273	17600

NOTE: Based on normal water level.
A. Based on 150 psig design pressure.
B. Based on 15 psig design pressure.

Table 21. Recommended Steam Nozzle Size (for 4000 to 5000 fpm nozzle velocity)

OPERATING PRES-SURE PSIG	Boiler HP										
	125	150	200	250	300	350	400	500	600	700	800
15	8	8	10	10	12	12	12	12	12	12	12
30	6	6	8	8	8	10	10	10	12	12	12
40	6	6	6	8	8	8	10	10	10	12	12
50	6	6	6	6	8	8	8	10	10	10	12
75	4	4	6	6	6	8	8	8	8	10	10
100	4	4	6	6	6	6	6	8	8	8	10
125	4	4	4	6	6	6	6	8	8	8	8
150	3	3	4	4	6	6	6	6	6	8	8
200	2.5	3	4	4	4	4	6	6	6	6	6
250	2.5	3	3	4	4	4	4	6	6	6	6

NOTES:

1. Steam nozzle sizes given in inches.
2. Recommended steam nozzle sizes based on 4000 to 5000 fpm steam velocity.
3. All standard steam nozzle sizes for 150 psig design pressure or greater are the same as 125 psig operating pressure on the above table. To increase or decrease the standard size, request the change with your local Cleaver-Brooks authorized representative.
4. Shaded area denotes special surge load baffles must be installed to avoid possible water carry-over.
5. For incremental operating pressures contact your local Cleaver-Brooks authorized representative.

Table 22. Recommended Non-Return Valve Size

BOILER HP	BOILER CAPACITY (LBS/HR)	OPERATING PRESSURE (PSIG)							
		50	75	100	125	150	175	200	250
100	3450	2-1/2	2-1/2	NA	NA	NA	NA	NA	NA
125	4313	3	2-1/2	2-1/2	2-1/2	NA	NA	NA	NA
150	5175	3	3	2-1/2	2-1/2	2-1/2	2-1/2	NA	NA
200	6900	3*	3	3	3	3	2-1/2	2-1/2	2-1/2
250	8625	4	3*	3	3	3	3	3	3
300	10350	4	4	4	3*	3	3	3	3
350	12025	4	4	4	4	4	3*	3	3
400	13800	5	4	4	4	4	4	4	3*
500	17210	6	5	5	4	4	4	4	4
600	20700	6	6	5	5	5	4	4	4
700	24150	6	6	6	5	5	5	5	4
800	27600	6	6	6	6	6	5	5	5

NOTE: Valve sizes (300 # Flanges) given in inches.

Standard Non-Return valve selections limited to a maximum 2 to 1 turndown (50% of full load); selections based on typical non-return valve sizing recommendations. For final valve selection contact your C-B authorized representative.

* Indicates pressure drop of less than 7.5 psig. All other selections are less than 6 psig pressure drop.

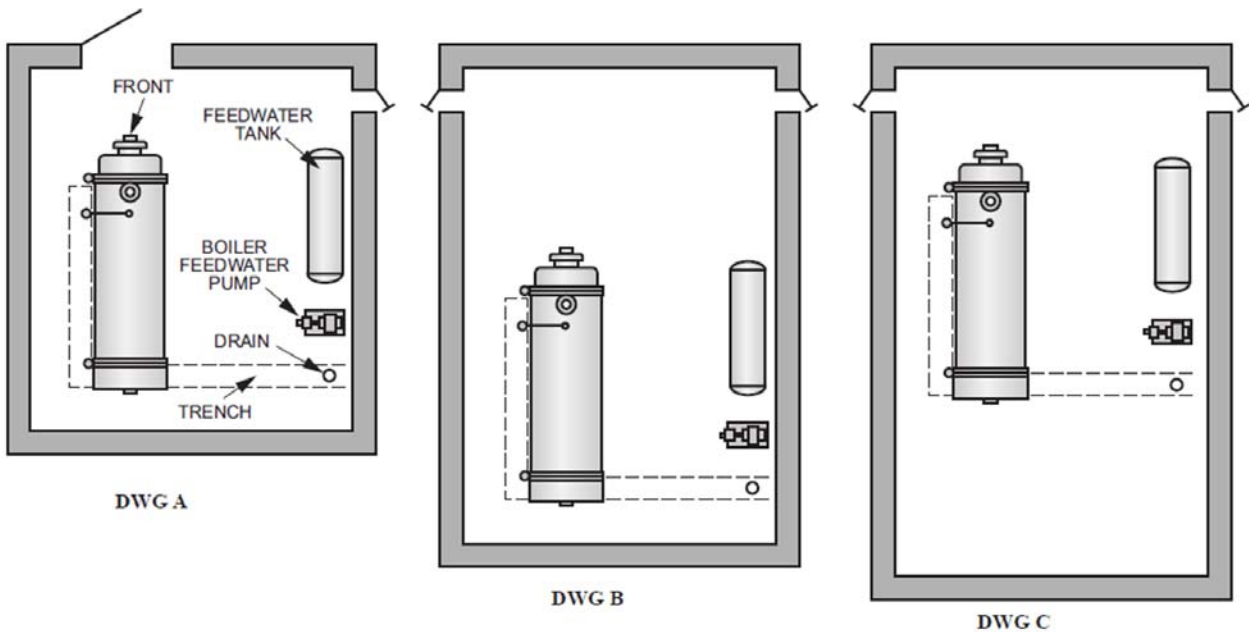


Figure 21. Boiler Room Length (Typical Layouts)

1. Shortest boiler room length (Dwg A) is obtained by allowing for possible future tube replacement (from front or rear of boiler) through a window or doorway. Allowance is only made for minimum door swing at each end of the boiler. This arrangement provides sufficient aisle space at the front of the boiler but a "tight" space condition at the rear. If space permits, approximately 1.5 additional feet should be allowed at the rear for additional aisle and working space.
2. Next shortest boiler room length (Dwg B) is obtained by allowing for possible future tube replacement from the front of the boiler. Allowance is only made for minimum door swing at the rear. If space permits, approximately 1.5 additional feet should be allowed at the rear for additional aisle and working space.
3. A slightly longer boiler room (Dwg C) is obtained by allowing for possible future tube replacement from the rear of the boiler. Allowance for door swing at the front provides sufficient aisle and working space at the front.

BOILER HP	125-200	250-350	400-800
Dimension A	82"	93"	102"
Dimension B	115"	141"	171"

NOTES:

1. Recommended Minimum Distance Between Boiler and Wall. Dimension "A" allows for a "clear" 42" aisle between the water column on the boiler and the wall. If space permits, this aisle should be widened.
2. Recommended Minimum Distance Between Boilers. Dimension "B" between boilers allows for a "clear" aisle of:
 42" - 125 -200 hp
 48" - 250-350 hp
 60" - 400-800 hp
 If space permits, this aisle should be widened.

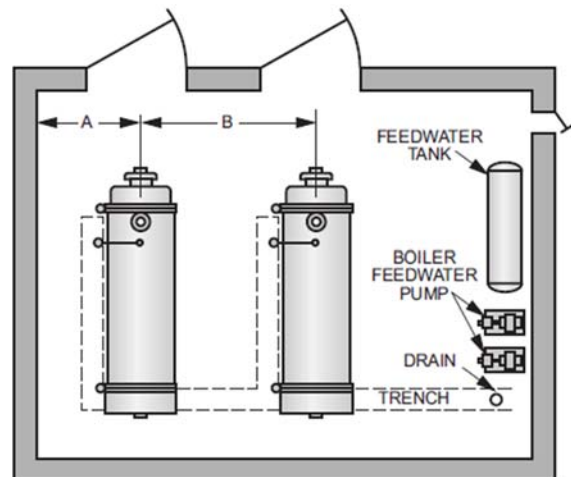
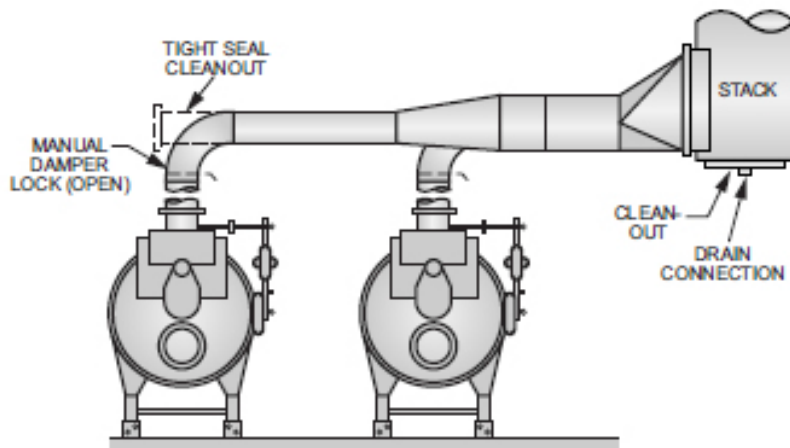


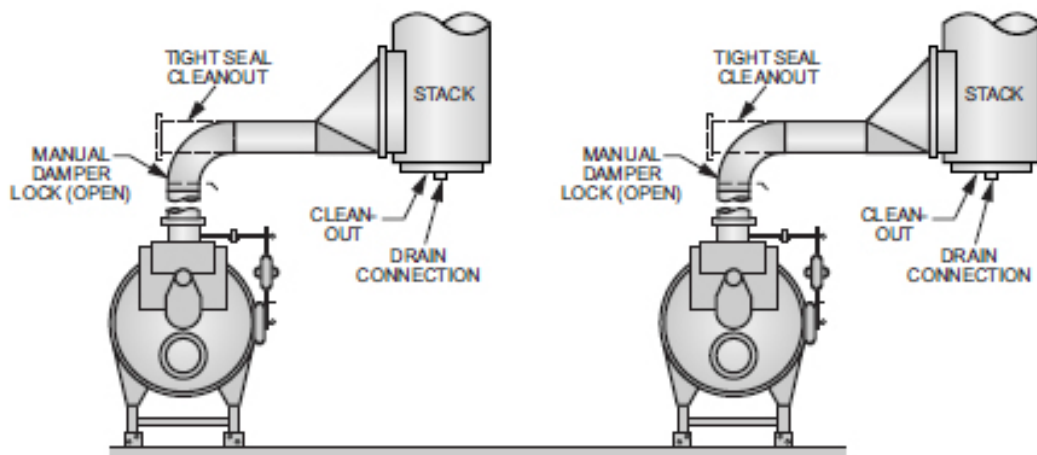
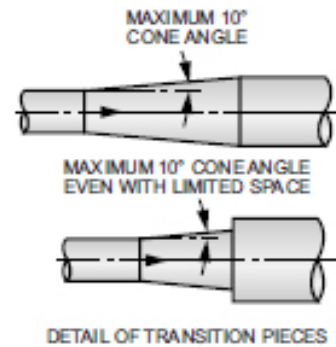
Figure 22. Boiler Room Width (Typical Layout)



MULTIPLE BOILERS WITH A COMMON STACK

NOTE: These stack breaching arrangements for multiple boilers are generic and not intended for your specific design requirements. For additional information, review Section F, Stacks.

Stack and breaching sizes should always be provided by a reputable stack supplier who will design the stack and breaching system based on your specific criteria. Your local Cleaver-Brooks authorized representative is capable of assisting in your evaluation of stack and breaching design.



MULTIPLE BOILERS WITH INDIVIDUAL STACKS

Figure 23. Breaching Arrangement



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