

## **INSTRUCTIONS**

### **Required Information for Equipment Acceptance**

For the Use of Non-Department Listed Boiler Assemblies

1. Submit a representative drawing or catalog cut which provides front and side elevation views of the boilers in the series. The combustion chamber and turnaround volume should be clearly noted on the drawing. The drawing or catalogue cut should be accompanied by a table which lists the relevant boiler dimensions for each size.
2. Submit a description of the oil flow system for each burner type with the relevant oil schematics. The oil schematics must show pressure gages (with stop cocks) and all other components of the system.
3. Complete the form and tables.
4. Attach a certified test report following the procedure below.
5. Explain how the oil delivery rate will be fixed to yield a specific firing rate for each burner. List the data in tabular form for each firing rate. Explain the method by which the burner oil delivery rate is permanently set to prevent changes in the firing rate.
6. Explain how the methods of limitation will be verified in the field during inspection.
7. An application for acceptance is not required for equipment that fires natural gas only or if the gross output firing rate is less than 2.8 million Btu/hr.

#### **Assembly Testing:**

1. The boilers are to be tested for overall and combustion efficiencies firing #2 fuel oil.
2. The tests can be conducted by either a Professional Engineer or by a nationally recognized laboratory following the approved test procedure. The Professional Engineer witnessing the test shall be registered in the state in which the test is conducted and must sign and seal the test report.
3. The selection of sizes for testing purposes will depend on factors such as the total number of boilers in the series, alternate burners and the materials of construction (steel or cast iron).
4. Submission of the test schedule, for review by the Department, shall be done at least 30 days prior to commencement of any testing to ensure that the test scheme selected is uniform and representative of the entire series of boilers or boiler assemblies.
5. For steel oil fired assemblies and bare boilers, one third of the product line shall be tested.
  - a. One half of the tests performed must be overall (thermal) efficiency tests of two hour duration.
  - b. The remaining tests shall be combustion efficiency tests of half hour duration.
6. For cast iron boilers and assemblies, two sizes within the first eight sizes shall be tested. For series consisting of more than eight sizes, one additional size is to be tested for each additional eight sizes.
  - a. One half of the tests performed must be overall (thermal) efficiency tests of two hour duration.

- b. The remaining test shall be combustion efficiency tests of half hour duration.
- 7. The Department, at its discretion, may request that additional boilers or boiler assembly sizes be tested.
- 8. High pressure boilers are to be tested at a pressure of 100 psig (115 psia) and low pressure boilers shall be tested at 10 psig (25 psia). Hot water boilers shall have a water temperature rise within the range of 125°F to 165°F and an outlet temperature of 200°F  $\pm$  5°F. While a hot water boiler can be tested as a steam boiler, the inverse is not acceptable.
- 9. The burner must be fired at 100%  $\pm$  5% of the maximum rated capacity of the boiler.
- 10. The method of burner limitation must correspond to the method of limitation data submitted with the acceptance application package.
- 11. All tests are to be performed with a smoke reading not exceeding #2 on the Bacharach Scale throughout the duration of the test.
- 12. Readings must be recorded at 15 minute intervals after the steady state condition is reached.
- 13. The test reports shall clearly include:
  - a. Model numbers of the boilers and burners that are used for the testing.
  - b. Method of burner limitation.

**For Overall Efficiency Test**

- c. steam temperature and pressure [for steam boiler applications],
- d. water temperature and pressure [for hot water boiler applications],
- e. temperature of throttling calorimeter and weight of the water collected in the calorimeter [for steam boiler applications],
- f. temperature and volume of feed water,
- g. ambient/boiler room temperature,
- h. volume, pressure and temperature of fuel oil,
- i. temperature and composition of the flue gases at the boiler outlet
  - i. %CO<sub>2</sub>
  - ii. %O<sub>2</sub>
  - iii. ppm of CO
  - iv. ppm of NO<sub>x</sub>
- j. smoke shade on the Bacharach Scale.

**For Combustion Efficiency Test**

- k. ambient/boiler room temperature
  - l. volume of feed water,
  - m. volume of fuel oil,
  - n. temperature and pressure of fuel oil,
  - o. temperature and composition of flue gases at the boiler outlet
    - i. %CO<sub>2</sub>
    - ii. %O<sub>2</sub>
    - iii. ppm of CO
    - iv. ppm of NO<sub>x</sub>
  - p. smoke shade on the Bacharach Scale.
14. Overall (thermal) efficiency shall not be less than 78% and combustion efficiency shall not be less than 83%.

15. Fuel analysis must be performed and the results submitted along with the test reports.
16. Steam quality (for steam boiler applications) must be measured with a throttling calorimeter during the overall efficiency tests.
17. For boiler assemblies seeking acceptance as low NO<sub>x</sub> assemblies, the overall (thermal) and combustion efficiency tests must be run with the low NO<sub>x</sub> components both engaged and disengaged for verification of the NO<sub>x</sub> level reduction. Unless the burner is integral to the boiler assembly, prior acceptance of the burner as a low NO<sub>x</sub> burner is required.
18. Calibration records for the instruments used to take readings and measurements during testing must be submitted along with the test reports.

### **Burner Test Information**

1. UL test data from a selection of sizes fully representing the given burner models are to be submitted. The tests shall indicate that the burners are capable of operating with a smoke shade not exceeding #2 on the Bacharach Scale.
2. Each burner shall be fired at both the maximum and minimum designed rate of the specific model tested. The test report shall include data for the low fire rate corresponding to each high fire rate. The tests are to be conducted using the heaviest grade of fuel for which acceptance is being requested.
3. For burners seeking acceptance as low NO<sub>x</sub> burners, the tests must be run with the low NO<sub>x</sub> components both engaged and disengaged for verification of the NO<sub>x</sub> level reduction. Historically, the Department has sought a minimum NO<sub>x</sub> level reduction in the range of 25-30 ppm for the purposes of obtaining acceptance as a low NO<sub>x</sub> burner. This range may be subject to upward revision as additional data and advances in the technology become available.

### **Fees:**

1. The fees shown below for equipment acceptance are required in accordance with LL58-91.
2. For each application for acceptance of fuel oil burning equipment, rated at 2.8 million Btu/hr or greater, the fee is \$600.
3. For each application for acceptance, other than fuel oil burning equipment, the fee is \$400
4. For each application for amendment of prior accepted equipment, the fee is \$300.

# Sample Generic Boiler Elevation Drawing

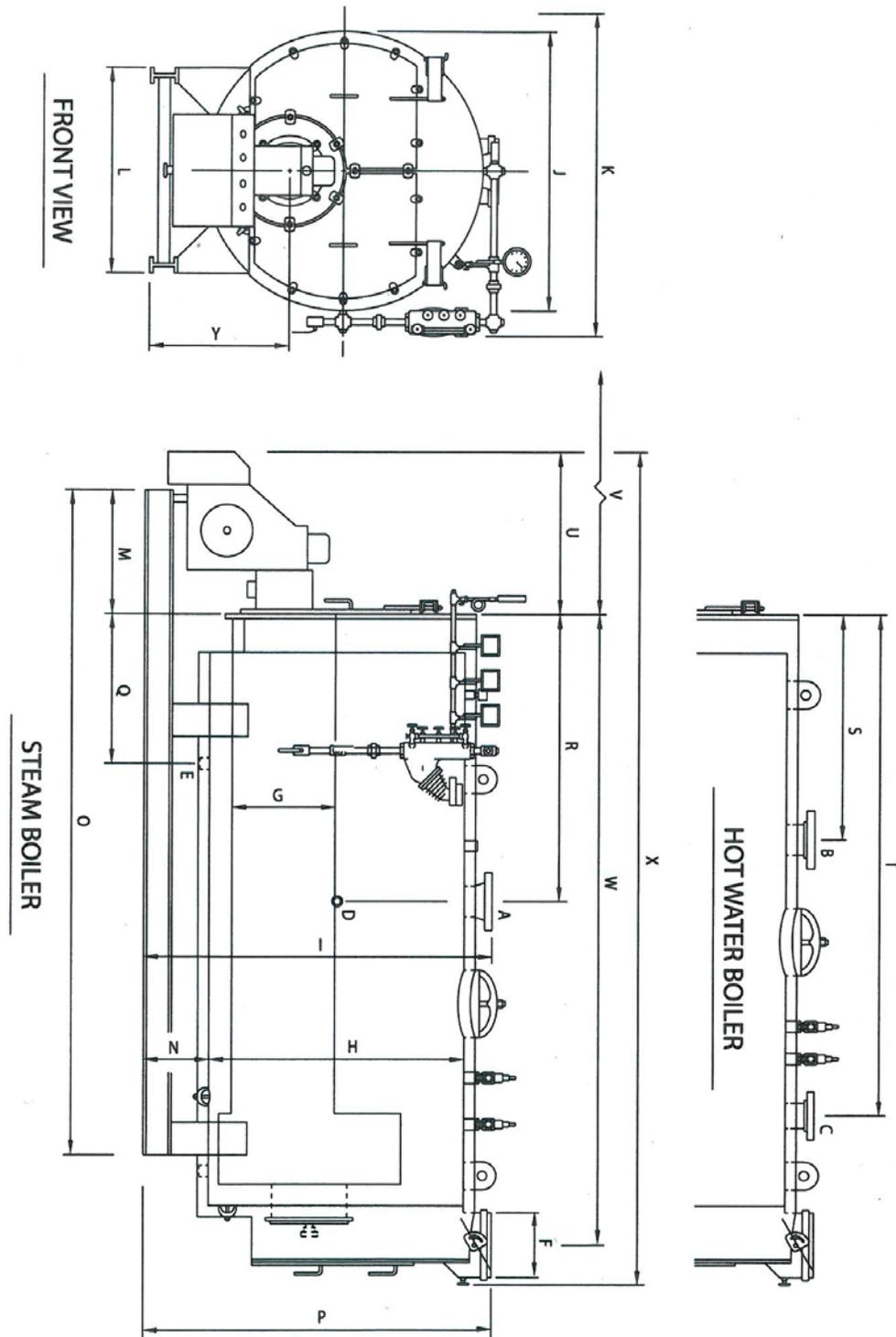


FIGURE 1

## Assembly Series Boiler Dimensions

BOILER MODEL – SIZE	DIM IN.						
<b>BOILER HORSEPOWER</b>							
Heating Surface	Fireside						
Steam Output	From & @212°F						
Gross Output (MBH)							
Firing Rate Gas (CFH)	1,000 BTU/CF						
Firing Rate #2 Oil (GPH)	140,000 BTU						
Firing Rate #6 Oil (GPH)	150,000 BTU						
<b>DIMENSIONS</b>							
* Note 1: Steam Outlet Size (150 PSI)	A						
* Note 2: Steam Outlet Size (15 PSI)	A						
* Note 2: Water Supply Size (30 PSI)	B						
* Note 2: Water Return Size (30 PSI)	C						
Feed Water Connection Size	D						
Blowdown Connection (BMT) HP	E						
Blowdown Connection (BMT) LP & HW	E						
Stack Outlet Size	F						
Furnace Outside Diameter	G						
Shell Inner Diameter	H						
Supply Height	I						
Width Without Trim	J						
Width With Trim	K						
Skid Width	L						
End of Skid From Front Plate	M						
Shell to Floor	N						
Skid Length	O						
Stack Outlet Height	P						
Blowdown Location	Q						
Steam Outlet Location (15 PSI and UP)	R						
Supply Location	S						
Return Location	T						
Burner Projection (Standard Burner)	U						
Tube Removal (Front)	V						
Stack Outlet Location	W						
Approximate Overall Length	X						
Center Line of Furnace (To Floor)	Y						
<b>WEIGHTS IN LBS</b>							
Approximate Shipping Weight	150 PSI						
Approximate Shipping Weight	15 & 30 PSI						
Water Capacity - Steam	NWL						
Water Capacity - Water	FLOODED						

Note 1: 3" and above are 300# ANSI flange.    Note 2: 4" and above are 150# ANSI flange.    Note: 100 HP and above has 12" x 16" Manway