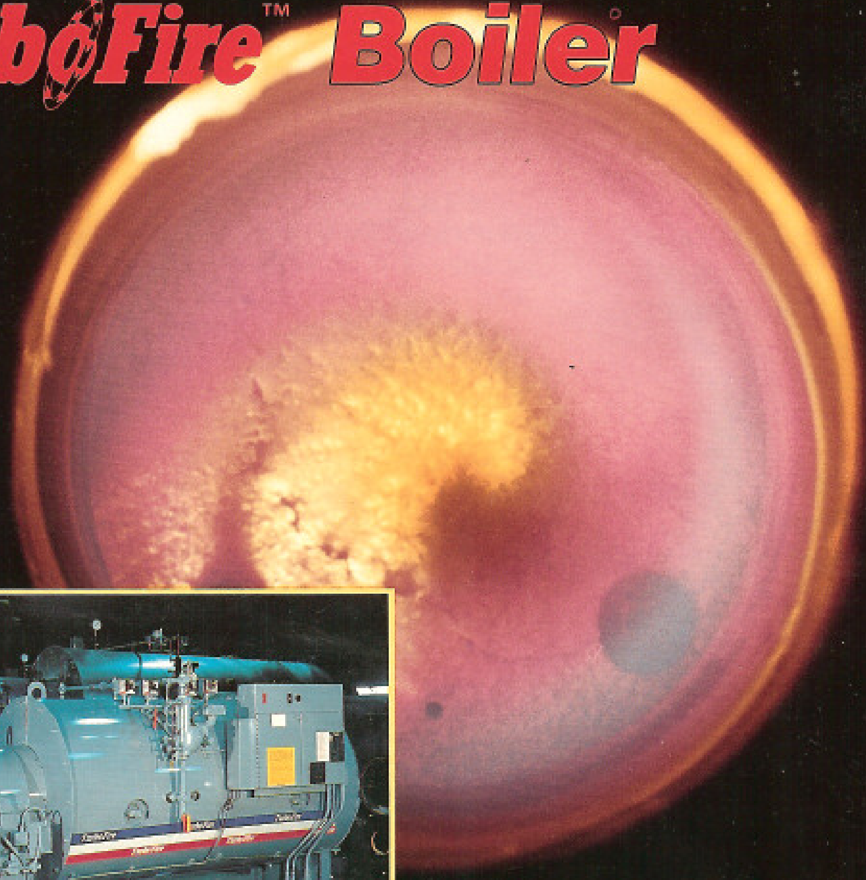
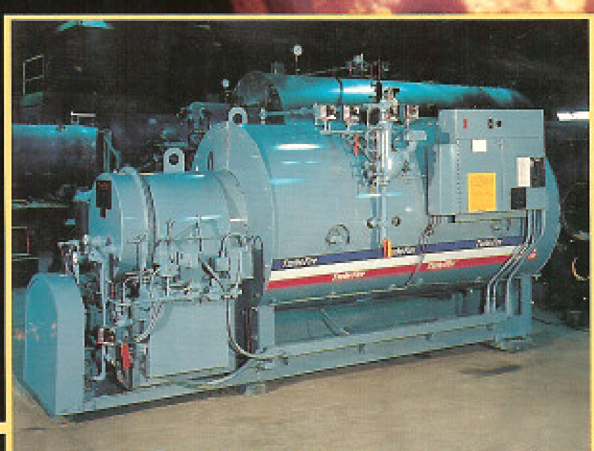
NEW HIGH EFFICIENCY

TurboFire™ Boiler®





Actual photo of TurboFire™ Burner flame taken from rear observation port.

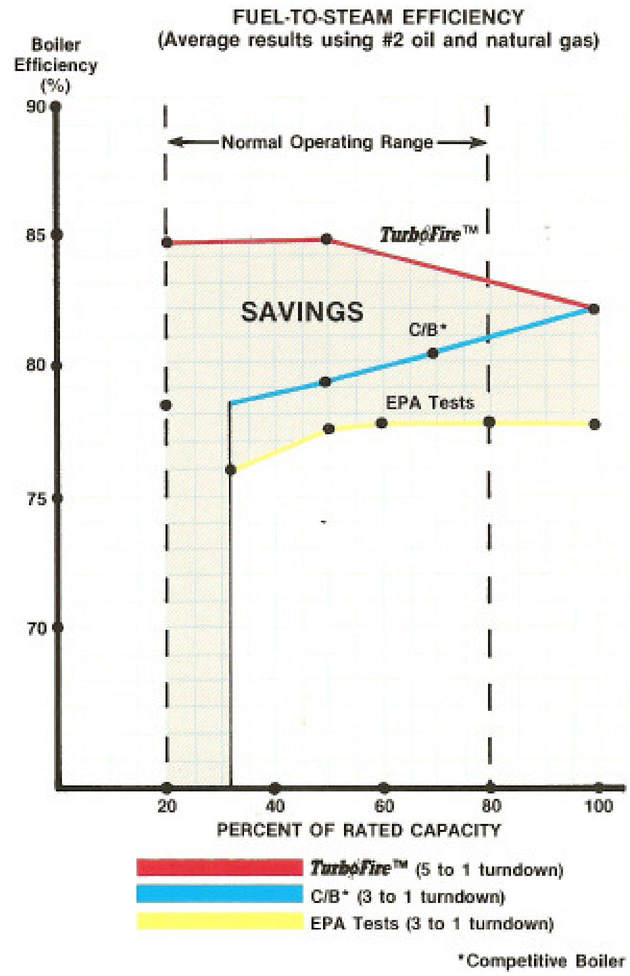
Highest Fuel-to-Steam Efficiency throughout a 5:1 Turndown Range

YORK-SHIPLEY™

A Division of **DONLEE** TECHNOLOGIES INC.

AMERICAN MADE
DONLEE TECHNOLOGIES INC.
AMERICAN OWNED

Fuel-to-Steam Efficiency Verified by Pennsylvania State University

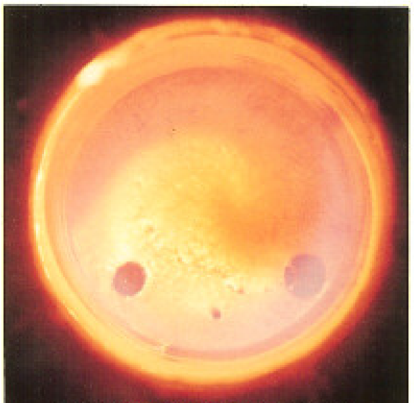


Extensive tests were conducted in accordance with ASME Power Test Codes and verified by the Combustion Laboratory, Pennsylvania State University during the development of the TurboFire™ boiler. These tests established the comparative fuel-to-steam efficiencies of the TurboFire™ boiler and a competitive boiler (refer to the Fuel-To-Steam Efficiencies graph). Note that EPA tests, as shown in the graph, were actually conducted by the government (see the government Publication EPA-60018-77-033a) and represent average efficiencies of a number of boilers tested in the field.

Boiler manufacturers make efficiency comparisons based on data obtained from boilers running at 100 percent capacity. Most boilers, however, are normally operated at less than 70 percent capacity.

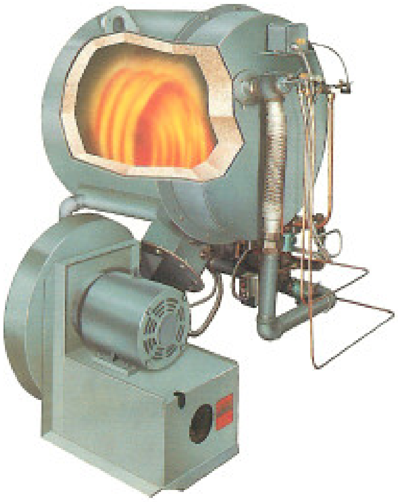
TurboFire™ boilers, as shown in the efficiency graph, actually provide increased efficiency over the entire 5 to 1 turndown range and highest efficiency is obtained in the normal operating range. This is not true of competitive boilers which require increased amounts of excess air as the load is reduced. TurboFire™ boilers require a minimum input of excess air, thus they maintain optimum efficiency . . . even at 20 percent capacity.

This high degree of efficiency results in considerable fuel savings. A 250 horsepower oil-fired conventional boiler, for example, run at 50 percent capacity over a 4,000 hour heating season in York, Pennsylvania has a fuel cost of $150,000. A TurboFire™ unit run under the same conditions, has a yearly cost of $140,700 . . . a savings of $9,300 per year!



New *TurboFire* Burner Flame, Low Fire, Oil

Conventional Burner Flame, Low Fire, Oil



New Concepts Combined With Quality Workmanship Guarantee Savings

Lower Operating Costs

York-Shipley's revolutionary, proprietary TurboFire™ boiler produces a cyclonic gas flow pattern, a pattern that causes intimate contact between the combustion gases and the furnace wall while reducing the gas temperature at the end of the first pass. The boiler flame pattern produces *better heat transfer* per square foot, distributing heat equally along the furnace wall. Only the TurboFire™ dual fuel design reduces excess air to less than *5% (gas) or 10% (oil) throughout the entire turndown range of 5:1.* This results in the most efficient boiler system available having a *fuel-to-steam efficiency in excess of 84% at 50% of capacity.*

TurboFire™ Boiler System Offers Outstanding Features

- No internal parts to adjust for easier maintenance.
- Forced draft burners eliminate costly stacks.
- Built-in heavy metal catwalk simplifies piping work and eliminates damage to boiler jacket during installation.
- Complete unit U.L. labeled.
- Front inspection and cleaning cover reduces cleaning time.
- Low motor horsepower, see data.

Reduced Floor Space Requirement

The TurboFire™ high efficiency boiler system is smaller by design, using less floor area than a typical boiler.

Quality Workmanship Backed by a Quality Guarantee

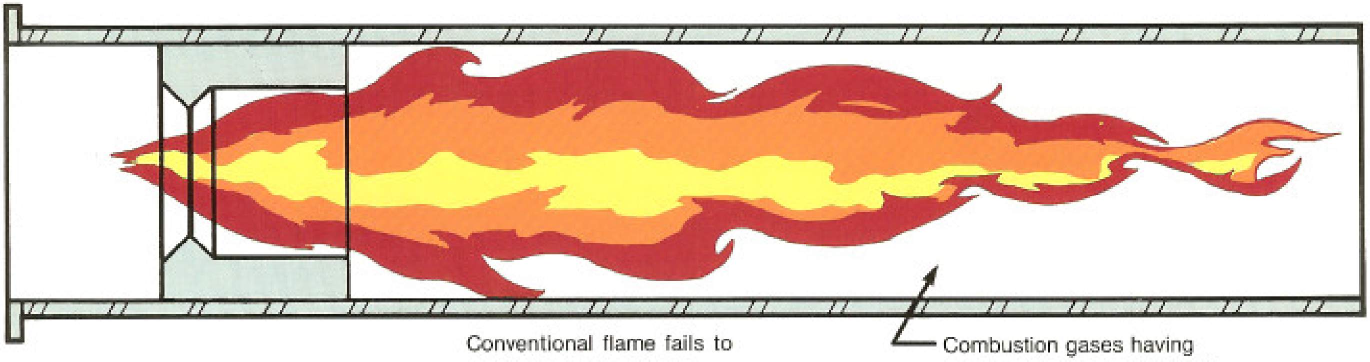
The only packaged boiler system in the industry with a . . .

THREE YEAR LIMITED WARRANTY

York-Shipley warrants TurboFire™ boilers against defective material and workmanship on all parts manufactured by York Shipley for a period of three years from the date of shipment. Material and components purchased from outside vendors and subcontractors will be warranted against defects in material and workmanship for a period of one (1) year from the date of original installation but not to exceed eighteen (18) months from the date of shipment. A detailed limited warranty is provided with York-Shipley's order acceptance.

Compare Flame Patterns

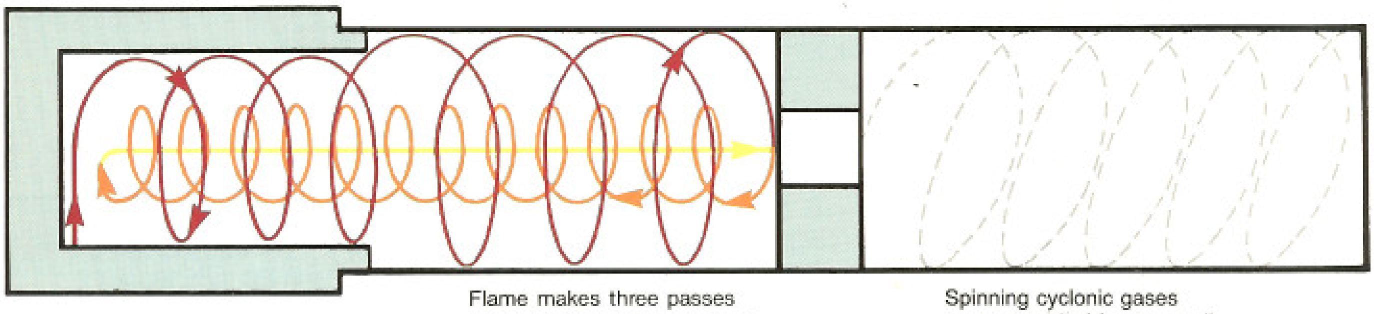
Conventional Flame Pattern



Conventional flame fails to distribute heat equally.

Combustion gases having low velocity are an insulator between wall and flame.

Flame Pattern



Flame makes three passes before entering "target ring".

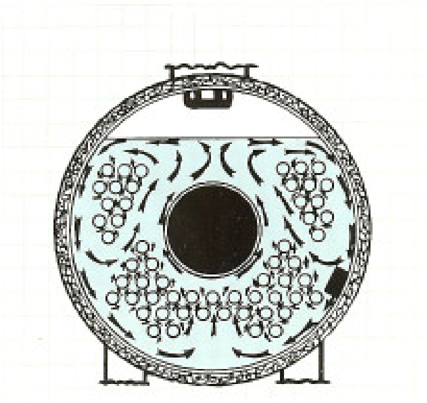
Spinning cyclonic gases contact 360° of furnace wall.

Fuel Efficiency with Advanced Boiler Design Technology

The York-Shipley three pass design TurboFire™ boiler uses a cyclonic gas flow pattern within a center furnace to effectively distribute heat and provide faster heating with controlled circulation. An exclusive York-Shipley "target ring" shapes the flame and funnels combustion gases to promote heat transfer.

The TurboFire™ boiler's water circulation system provides for not only quick heating but fast steaming and high quality dry steam. The large number of heating tubes without dead space assure quick response to any load changes. Controlled water circulation uses the scrubbing action of the rising water flow to prevent accumulation of corrosive oxygen and carbon dioxide bubbles on the tube surfaces. Baffles prevent direct impingement of feed water on the heating surfaces.

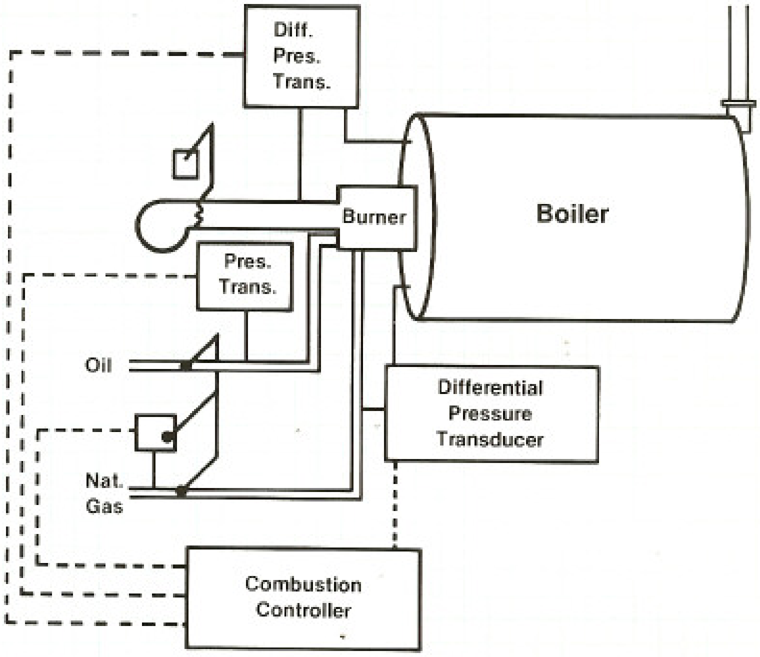
A steam separator beneath the steam outlet assures dry saturated steam with a moisture content no greater than half of one percent.



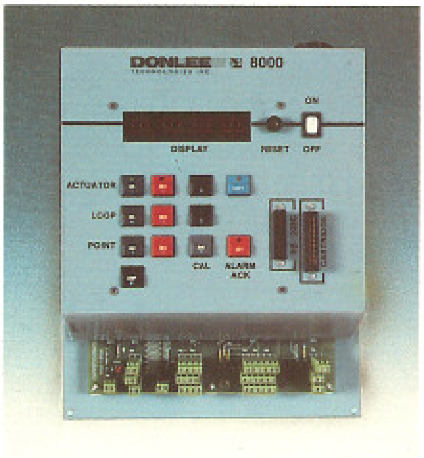
YS-7000
Microcomputer Controller

The YS-7000, standard equipment with the TurboFire™ boiler, is an intelligent microcomputer based integrated control system for automatically fired gas, oil, or combination fuel applications. Its principal control and logic element is a high reliability microcomputer that is programmed to provide levels of safety, functional capability, and features beyond the capacity of conventional electromechanical or discrete solid state controls.

- Exclusive Low Water Cutoff is only available from York-Shipley. It continuously monitors boiler water level.
- Safety features include: Dynamic Self Check Logic, Expanded Safe Start Check, Dynamic Input Check, Closed Loop Output Check, High Fire Purge Switch Test, Low Fire Start Switch Test, Tamper resistant timing and logic.
- Fault Codes isolate the cause of a safety shutdown. Hold Codes identify the causes of a failure to start or proceed in the burner control sequence.
- Triple Function Test Switch, halts the sequence at the end of prepurge, during pilot trial, and drives the firing rate to low fire during run cycle.



YS-8000
Combustion Controller



- The Combustion Controller, an optional feature offered by the TurboFire™ Boiler System, is a field-proven combustion control system that uses a pre-set combustion curve to achieve optimum air-to-fuel ratio.
- The Combustion Controller provides the minimum excess air at each firing rate which assures peak efficiency and provides fuel savings. A modified metering system combined with microcomputer technology eliminates the problem of characterizing fuel valves. Excess air can be optimized for each type of fuel.
- The YS-8000 avoids the expense of regular calibration and air sample replacement of continuous stack gas analyzers. Calibration is required only during initial startup.
- A "tracking mode" automatically modulates air and fuel motors in the event of transducer or computer failure.
- An on-board time clock assures accurate steam pressure control. An adjustment range plus time of day variations are provided.
- The unit offers a display and recorder for both fuel flow and steam flow. These are clearly enunciated on the face of the control panel.

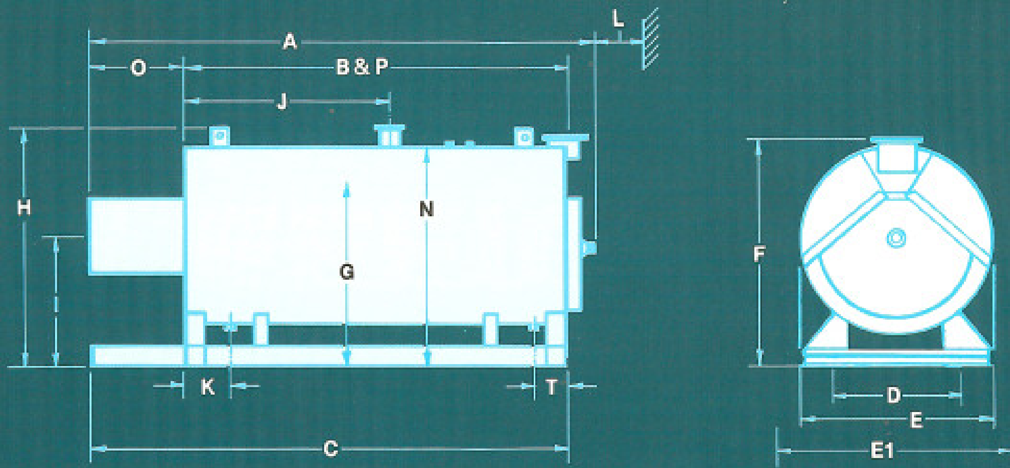
Gross Ratings Capacity

YS SERIES											
		100 HP	981 KW	125 HP	1226 KW	150 HP	1471 KW	200 HP	1962 KW	250 HP	2452 KW
Approx. Boiler HP (KW)		100	981	125	1226	150	1471	200	1962	250	2452
Steam Lbs. per Hr. (KG/hr)		3450	1568	4313	1960	5175	2352	6900	3136	8625	3920
E.D.R. Sq. Ft. (Sq. Met.) Gross Steam		13958	1296	17447	1621	20937	1945	27916	2593	34895	3242
Gross Water		22333	2075	27916	2593	33500	3112	44666	4149	55833	5187
M.C.A. Net Load Rating Steam Sq. Ft.		11158	1037	13948	1296	16738	1555	22317	2073	27896	2591
M.B.T.U. (KCAL), Input per Hr.		3938	992	4923	1241	5907	1489	7876	1985	9846	2481
M.B.T.U. (KCAL), Output per Hr.		3348	843.7	4184	1054	5021	1265	6695	1687	8369	2109
Min. Safety Valve Cap YSL, YSW	Lb./Hr.(KG/Hr.)	4000	1818	5000	2273	6000	2727	8000	3636	10000	4545
Min. Safety Valve Cap YSH	Lb./Hr.	4184	1901.8	5021	2282.3	6000	2727	8369	3804.1	10043	4565
Dry Weight* Lbs. (KG)	YSL / YSW	5510	2499	5510	2499	6035	2737	9470	4295	10550	4785
	YSH	6140	2785	6140	2875	6825	3096	11230	5094	12590	5710
Wet Weight* Lbs. (KG)	YSL	8717	3954	8717	3954	6272	2845	15634	7090	17955	8144
	YSW	9347	4240	9347	4240	10217	4634	16784	7613	19338	8770
	YSH	9075	4116	9075	4116	10598	4807	17394	7890	19995	9070
Water Capacity Gallons – Liters	YSL / YSH	385	1457	385	1457	453	1715	740	2801	889	3365
	YSW	428	1620	428	1620	502	1900	878	3323	1055	3993

Steam ratings are from water at 212°F. to steam at 212°F. Standard pressures steam 15 PSI and 150 PSI, Water 30 PSI
Steam ratings are from water 100°C. to steam at 100°C. Standard pressures steam 1.06 Kg/cm^2 and 10.55 Kg/cm^2, Water 2.12 Kg/cm^2
*Weights for Standard Light Oil Units

Burner Data

YS SERIES											
		100 HP	981 KW	125 HP	1226 KW	150 HP	1471 KW	200 HP	1962 KW	250 HP	2452 KW
Input 1000 BTU Gas CFH (CMH)		4033	114.2	4965	140.6	5983	169.4	7944	224.9	10054	284.7
Input 140 MBTU, Lt. Oil GPH (LPH)		28.75	108.8	35.75	135.3	42.75	161.8	57.25	216.7	71.6	270.6
Oil Pump Motor Size (HP)		1/3	.249	1/3	.249	1/3	.249	1/3	.249	1/3	.249
Oil Pump Capacity (GPH)		140	530	140	530	140	530	140	530	140	530
Forced Draft Blower Motor HP (KW)		7.5	5.59	7.5	5.59	10	7.45	10	7.45	10	7.45
Forced Draft Blower (RPM)		3450	3450	3450	3450	3450	3450	3450	3450	3450	3450
Forced Draft Blower CFM (CMM)		1000	28.32	1250	35.4	1500	42.48	2000	56.64	2500	70.8
Air Compressor Motor HP (KW)		3	2.23	3	2.23	3	2.23	5	3.73	5	3.73
St'd. Control Circuit Voltage		115	115	115	115	115	115	115	115	115	115
St'd. Blower Motor Characteristics		3/230/60	3/230/60	3/230/60	3/230/60	3/230/60	3/230/60	3/230/60	3/230/60	3/230/60	3/230/60
St'd. Oil Pump Motor Characteristics (Lt. Oil)		1/115/60	1/115/60	1/115/60	1/115/60	1/115/60	1/115/60	3/230/60	1/115/60	1/115/60	1/115/60
Type Ignition	Lt. Oil	Gas/ Elec.	Gas/ Elec.	Gas/ Elec.	Gas/ Elec.	Gas/ Elec.	Gas/ Elec.	Gas/ Elec.	Gas/ Elec.	Gas/ Elec.	Gas/ Elec.
	Other Fuels	Gas/ Elec.	Gas/ Elec.	Gas/ Elec.	Gas/ Elec.	Gas/ Elec.	Gas/ Elec.	Gas/ Elec.	Gas/ Elec.	Gas/ Elec.	Gas/ Elec.



Dimensions in Feet and Inches — Centimeters

YS SERIES		100 HP	785 KW	125 HP	1226 KW	150 HP	1471 KW	200 HP	1962 KW	250 HP	2452 KW
A–Overall Length		12' 8"	386.1	12' 8"	386.1	13' 10"	421.6	14' 11"	454.7	16' 8"	508.0
B–Length of Shell		8' 3"	251.5	8' 3"	251.5	9' 5"	287	10' 6"	320	12' 3"	373.4
C–Length of Skid		11' 8"	355.6	11' 8"	355.6	12' 10"	391.2	14'	426.7	15' 9"	480.1
D–Width of Skid		2' 9"	83.8	2' 9"	83.8	2' 9"	83.8	5' 5"	165.1	5' 5"	165.1
E–Boiler Width		4' 5"	134.6	4' 5"	134.6	4' 5"	134.6	5' 5"	165.1	5' 5"	165.1
E1–Overall Boiler Width		5' 5"	167.6	5' 5"	167.6	5' 5"	167.6	6' 5"	195.6	6' 5"	195.6
F–Height of Vent Conn.		5' 9"	175.3	5' 9"	175.3	5' 9"	175.3	6' 11"	210.8	6' 11"	210.8
G–Height of Water Line YSH		4' 8"	142.2	4' 8"	142.2	4' 8"	142.2	5' 6"	167.6	5' 6"	167.6
G–Height of Water Line YSL		4' 7"	139.7	4' 7"	139.7	4' 7"	139.7	5' 5"	165.1	5' 5"	165.1
H–Overall Height–YSL, YSW[b], YSH		5' 11"	180.3	5' 11"	180.3	5' 11"	180.3	7' 1"	215.9	7' 1"	215.9
I–Floor to Burner		3' 4"	101.6	3' 4"	101.6	3' 4"	101.6	4' 0"	121.9	4' 0"	121.9
J–Location Top Conn. YSH		3' 5"	96.5	3' 5"	96.5	3' 5"	96.5	4' 3"	129.5	4' 3"	129.5
J–Location Top Conn. YSL		4' 7"	139.7	4' 7"	139.7	4' 7"	139.7	4' 3"	129.5	4' 3"	129.5
J–Location Top Conn. YSW[a]		4' 7"	139.7	4' 7"	139.7	4' 7"	139.7	4' 3"	129.5	4' 3"	129.5
K–Location Bottom Conn. YSL, YSW[a]		1' 6"	45.7	1' 6"	45.7	1' 6"	45.7	1' 9"	53.3	1' 9"	53.3
L–Dist. Rear Tube Removal		5' 4"	162.6	5' 4"	162.6	6' 6"	198.1	7' 7"	231.1	9' 2"	279.4
N–Floor to Shell Height		5' 4"	162.6	5' 4"	162.6	5' 4"	162.6	6' 7"	200.6	6' 7"	200.6
O–Burner Extension		3' 7"	109.2	3' 7"	109.2	3' 7"	109.2	3' 8"	111.7	3' 8"	111.7
P–Location of Vent Connection		8' 3"	251.5	8' 3"	251.5	9' 5"	287	10' 6"	320	12' 3"	373.4
T–Location Blowdown Conn.		1' 6"	45.7	1' 6"	45.7	1' 6"	45.7	1' 8"	50.8	1' 8"	50.8
Boiler I.D.	Inches	48"	121.9	48"	121.9	48"	121.9	60"	152.4	60"	152.4
Size Tube	Inches	2"	5.1	2"	5.1	2"	5.1	2"	5.1	2"	5.1
Bottom Shell to Floor	Inches	15"	38.1	15"	38.1	15"	38.1	18"	45.7	18"	45.7
Supply Sizes	YSL In. (cm)	8"	20.3	8"	20.3	8"	20.3	10"	25.4	10"	25.4
	PSI (KG/cm²)	150 # Flg.	10.5	150 # Flg.	10.5	150 # Flg.	10.5	150 # Flg.	10.5	150 # Flg.	10.5
	YSH In. (cm)	3" SCR.	7.6	3" SCR.	7.6	3" SCR.	7.6	4" 300# Flg.	10.2 21.1	6" 300# Flg.	15.2 21.1
Top Connection	YSW In. (cm)	4"	10.2	4"	10.2	4"	10.2	6"	15.2	6"	15.2
	PSI (KG/cm²)	150 # Flg.	10.5	150 # Flg.	10.5	150 # Flg.	10.5	150 # Flg.	10.5	150 # Flg.	10.5
Return Size	YSL In. (cm)	4" SCR.	10.2	4" SCR.	10.2	4" SCR.	10.2	4" SCR.	10.2	4" SCR.	10.2
Bottom Connection	YSW In. (cm)	4" SCR.	10.2	4" SCR.	10.2	4" SCR.	10.2	6" 150 # Flg.	15.2 10.5	6" 150 # Flg.	15.2 10.5
Feed Water Conn. Size	YSH & YSL	1¼" SCR.	3.2	1¼" SCR.	3.2	1¼" SCR.	3.2	1½" SCR.	3.8	1½" SCR.	3.8
Vent Size	Inches – (cm)	11½"	29.2	11½"	29.2	11½"	29.2	11½"	29.2	11½"	29.2

(a) Water boilers reverse flow
(b) Clearance for Safety Valves add 8" (20 cm) Clearance for Optional Aqua-Temp add 25" (64 cm)

Dimensions and specifications subject to change without notice. All equipment specifications are subject to confirmation by York-Shipley upon receipt of formal order.

IMPORTANT ORDERING CONSIDERATIONS

When ordering, the following must be specified, in addition to the model numbers:

- FUEL — Grade of oil, if fuel oil. If gas, specify whether natural, mixed, manufactured or LP; also the BTU content, and gas pressure available at boiler. Check the available pressure against our minimum gas pressure requirement.
- ELECTRICAL — Electrical characteristics for motors 220/60/3 (25-30 hp [245 KW-294.3 KW] — 115 volt standard) standard control circuit is 110/60/1, separate supply. Step down transformer for control circuit optional at extra cost. Other voltages available at extra cost.
- OPTIONALS — Refer to specification sheets for list of available optional items at extra cost. State fully optional items desired.
- ALTITUDE — Exact altitude if above 2000 ft. (609.6 met.)

YORK-SHIPLEY BOILER UNIT IDENTIFICATION CHART

YSH 100-N/2

Design
- H — High Press
- L — Low Press*
- W — Hot Water*

Horsepower

Fuel
- 2 — #2 Light Oil
- N — Natural Gas
- N/2 — Combination Gas/#2 Oil
- 6 — #6 Heavy Oil*
- N/6 — Combination Gas/#6 Oil*

***Check factory for availability**

The YS TurboFire™ Burner development is a joint effort between the Institute of Gas Technology (IGT), Chicago, Illinois & York-Shipley, Division of Donlee Technologies, Inc.

Available From:

YORK-SHIPLEY™
A Division of DONLEE TECHNOLOGIES INC.

YORK-SHIPLEY U.S.A.
693 North Hills Road
York, PA 17402-2212
Tel: 717-755-1081
FAX: 717-755-0020

YORK-SHIPLEY OF CANADA
1297 Industrial Road
Cambridge, Ontario N3H4W3
Tel: 519-653-7172
Telex: 069-59-374
FAX: 519-653-2091

YORK-SHIPLEY INTERNATIONAL DIVISION
693 North Hills Road
York, PA 17402-2212
Tel: 717-755-1081
FAX: 717-755-0020

ID 87-708R 2/89 2.5M