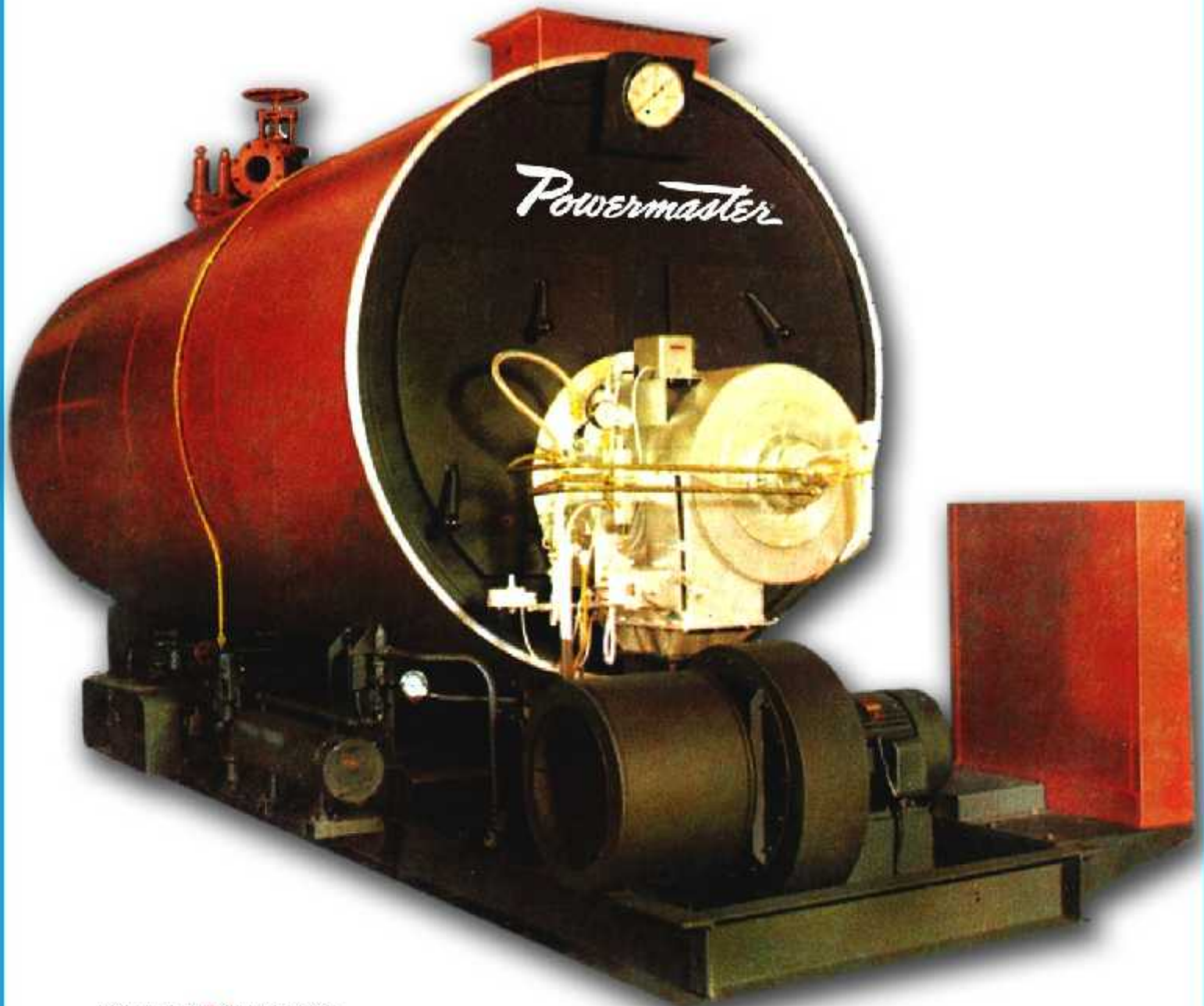


# Powermaster<sup>®</sup>

By Orr & Sembower Inc USA

## PACKAGED BOILERS DRY OR WET BACK DESIGN



ADVANTAGE GUARANTEED

**GRESHAM'S**

⚡ ⚙️ ⚙️ ⚙️ \* THE ENERGY-ENVIRO SPECIALISTS

**Boiler manufacturer  
since 1971**

ADVANTAGE  GUARANTEED

# GRESHAM'S

    THE ENERGY-ENVIRO SPECIALISTS

## THE GRESHAM'S STORY

Gresham's started boiler manufacturing in 1971 in an association with Karachi Shipyard & Engineering Works Limited as a pioneering project for Pakistan. To date, we have manufactured over 1200 boilers of various designs for customers ranging from food processors to power plant boilers. We have been the first in CoGeneration and EPC Projects. Notable installations include the Finance & Trade Centre at Karachi, The MCB Towers, the SNGPL Head Office Building and many others.

Gresham's Boilers exported to France, Italy, Algeria, Iraq, UAE, Saudi Arabia, Sri Lanka, Bangladesh, Myanmar and Afghanistan are a testimony of our quality.

## Quality Inspiration.



William Edwards Deming was an American engineer, statistician, professor, author, lecturer, Quality Expert. Mr. Deming inspired Toyota to quality manufacture in 1954.

Boilers of Firetube, Watertube, Forced circulation Steam Generators, Waste Heat Recovery Units, Power plant boilers, Themic oil Boilers, Hot air generators, RO & Water Treatment Plants, Heat Exchangers, Equipment for oil and gas industries, Portable accomodation systems, Filtration Plants are manufactured under licence agreements from world renowned brands such as Powermaster, Keeler, Wanson, Ygnis, Alpha boilers..... to give you a highly engineered, safe & efficient products built to ASME Standards and Inspected by Germanischer Lloyds, TUV, SGS....

In 1982 we originated the idea of energy conservation and were behind the Boilers in Pakistan study done by the Ministry of Production which study led to the creation of ENERCON.

**Gresham's** -- dedicated to boiler manufacture since 1971, -- commitment to energy conservation, -- commitment to deliver a safe reliable product.



ASME Codes used for manufacturing all Boilers.



## By Orr & Sembower Inc USA

### LARGE FURNACE VOLUME

The National Academy of Sciences National Research Council in their Publication 981 states that "Limits must be set to ensure that the furnace section of the boiler is not overloaded causing excessively high temperatures at the furnace exit. These limits according to the task groups should be 150,000 Btu's per hour of fuel per cubic foot of effective furnace volume."

The large furnace volume of all Powermaster boilers is designed to meet or exceed this criteria.

### ENGINEERED FOR ECONOMICAL SAFE, RELIABLE PERFORMANCE

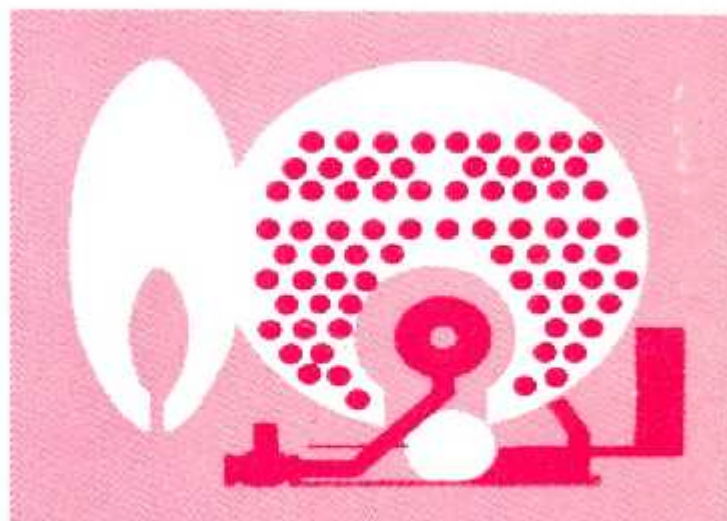
Powermaster Model 6 packaged boilers are the culmination of a vast amount of experience and knowhow and reflect new standards of excellence in performance and dependability.

These fully automatic packaged boilers in sizes 40 to 700 horsepower are feature for feature the most efficient available. They are designed and manufactured to set the highest industry standards and meet the requirements of the ASME Code. Component parts are of rugged construction and design and are carefully machined, centered and balanced. Moving parts are kept to a minimum, reducing wear and consequent replacement expense. Basic simplicity, coupled with the highest quality materials, careful workmanship, and thorough testing insures long-lived, troublefree operation and low maintenance cost.

Manufacturing facilities are geared to provide uniform quality, accurate conformance to specifications, and prompt delivery. All Powermaster packaged boilers are guaranteed for a period of one year against defective material or workmanship.



**Full length corrugated furnace provided on boiler design above 7 tph onwards**



### BALANCED COMPONENTS FOR MAXIMUM HEAT UTILIZATION & HIGHEST EFFICIENCY

modified scotch marine boiler is of advanced dryback design and guaranteed 88% plus efficiency. Rated at five square feet of heating surface per boiler horsepower, it is engineered to extract maximum heat from every gallon of oil or cubic foot of gas used. Forced draft design eliminates expensive tall stacks and over-fire draft controls.

### TUBES

Sizes and arrangement are engineered to assure maximum heat transfer. Temperature in final pass is maintained just above the dew point preventing corrosion damage that might be caused by condensed vapors. Tubes are rolled and beaded in high temperature areas and seal welded in high pressure boilers.

### DOORS

Front and rear reversing chambers are equipped with hinged, pressurized, heavily insulated gas-tight doors which swing open easily for inspection and cleaning of all firing surfaces. Where space is restricted a davit can be provided to lift doors off hinges. Both front and rear doors provided with observation ports. High pressure models are fusion welded, stress relieved and X-rayed as required by ASME codes. Each boiler is encased in a metal jacketed heat resistant sheath assuring utmost insulating properties. No insulation is required at the job site. Integral structural steel saddles and skids facilitate placement in the boiler room. It is delivered fully equipped and completely wired, ready for fast installation. Our service connections need be made at the job site to place in operation.

## ADVANCED BURNER DESIGN

Model 6 firing equipment is of a simple, advanced air atomizing type to efficiently burn all grades of oil gas or combination oil-gas. Full modulation provides optimum efficiency at light as well as normal operating loads with high turndown ratios.

The burner head completely mixes fuel and air and controls the flame pattern. This mixing occurs on the furnace side of the diffusion face and not in the air tube thus preventing flashback and flame instability. All combustion air is furnished through the burner head.

The main casting of the firing head forms the outside cover plate. A primary air tube connects this cover plate and the diffuser head. Straightening air vanes to control the primary air pattern are contained within this assembly. On gas and combination units, multiple gas tubes convey the gas from the gas manifold to the diffuser head. Within the primary air tube concentric tubes convey the atomizing air and oil from the tailpiece casting to the oil nozzle.

Intermittible gas-electric ignition is standard. Diesel-electric ignition can be furnished when required.

**Orr & Sembower Inc USA**  
**Inventors of packaged boilers since 1931**

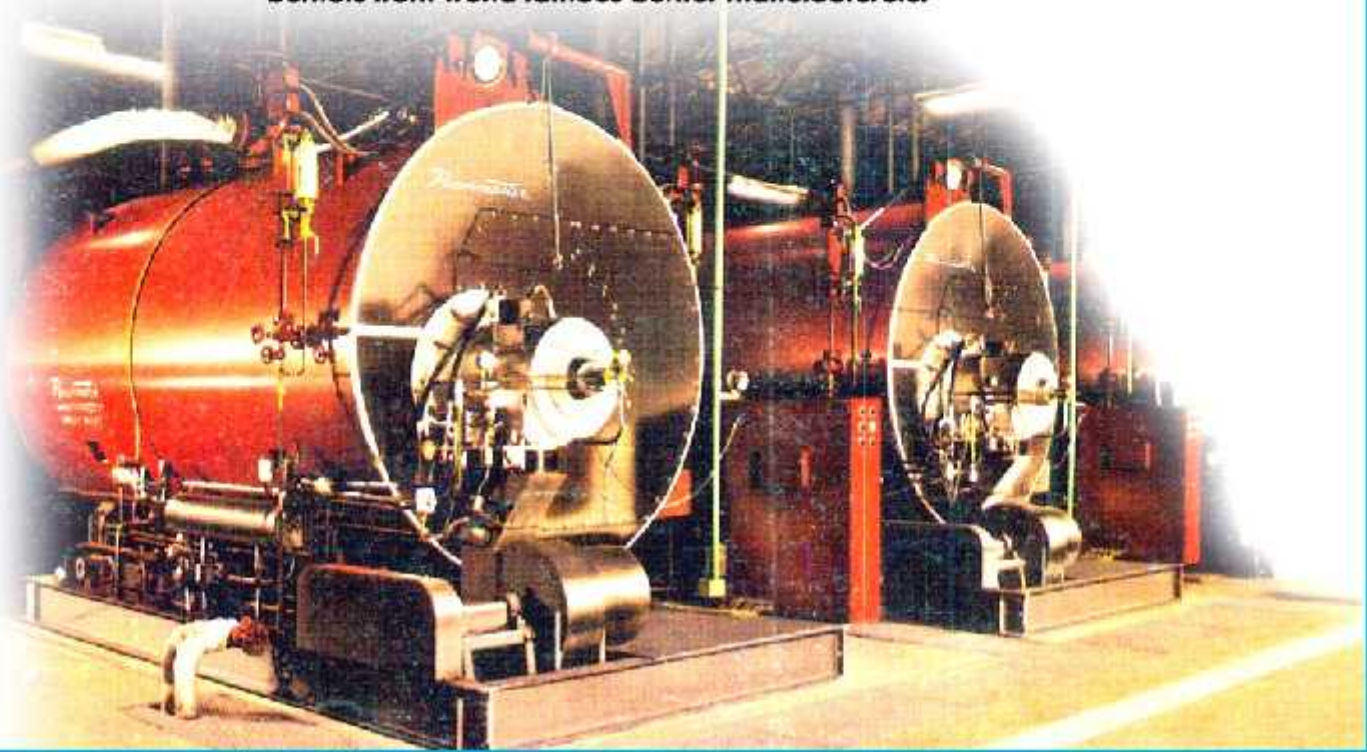
## OIL FIRING

A pre-piped and wired two-stage positive displacement pump circulates oil to a point immediately behind the nozzle assembly. It is then mixed with low pressure air and forced through the nozzle into the dual air streams provided by the forced draft fan. This system generates a short controlled flame which assures that combustion takes place well within the furnace length. Automatic temperature controls make sure that the oil reaches the proper temperature before the burner commences the automatic ignition and firing cycle. A special feature of the Powermaster heavy oil fuel nozzle is that it is self cleaning. Air is blown through the tube and oil nozzle assembly before and after each firing cycle purging fuel passages.

## GAS FIRING

The Powermaster gas fired boiler is designed specifically to achieve stable, safe efficient combustion, and to operate at capacity with low pressure natural gas. A unique method of gas introduction through multi-jet ports around the inner and outer perimeter of the diffuser face provides perfect distribution of gas into both primary and secondary air outlets. These ports, surrounding the perimeter of the firing plate ring, permit instantaneous mixing of gas and combustion air at the face of the firing plate resulting in a stable flame pattern. This system effectively prevents flashback into the burner. Blow-off is likewise impossible with any reasonable fuel-air proportions.

***Powermaster boilers can be equipped with Rotary cup burners from world famous burner manufacturers.***



### COMBINATION FIRING

With combination firing, oil and gas features are engineered into a single unit. Fuel change-over is automatic at the flip of a switch. No other manual settings are required.

### STANDARD EQUIPMENT

Integral steel saddles and skids; high temperature insulation and steel jacket; insulated hinged front and rear doors; stack thermometer; refractory; front and rear pyrex observation ports; openings for operating and limit controls, gauges, surface blowoff, drain, or bottom blow-down; handholes; manhole (high pressure steam - 80 hp and larger; low pressure steam and hot water - 125 hp and larger).

### STANDARD TRIM FOR STEAM UNITS

Trim for steam units: Combination water column with integral low water cutoff, alarm switch and feed pump control switch, water gauge try cocks and drain valve; pressure gauge with gauge cock(s); ASME approved safety valve(s). Feed water pumps, main valve, feed check & Stop valve (s), blowdown valve, column drain valve. Optional Equipment: Water Softener, Deaerator, Economiser & other Boiler Room accessories.

### COMPLETELY PRE-WIRED PLC CONTROL CABINET SIMPLIFIES BOILER OPERATION

Each Powermaster Model 6 unit is furnished with an enclosed, dust resistant, pre-wired PLC based control system with GPRS system to continuously monitor boiler even at remote locations for performance. Our components are of world famous origin.

### Optional Equipment:

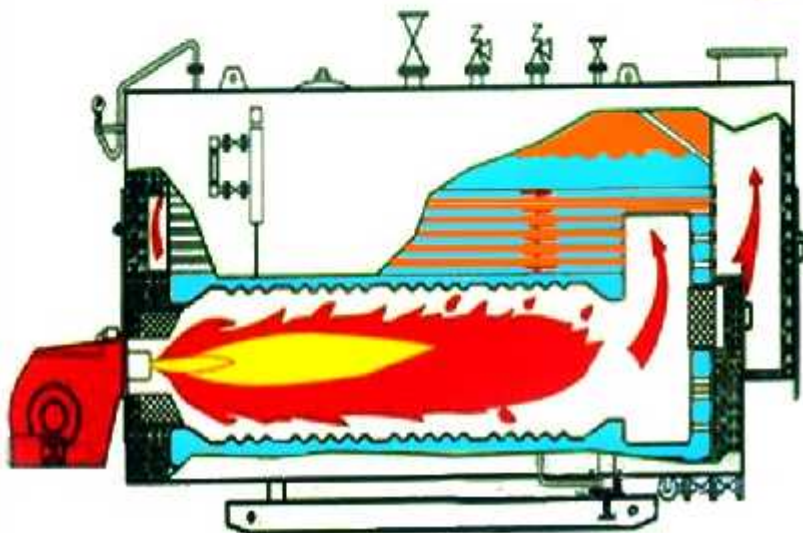
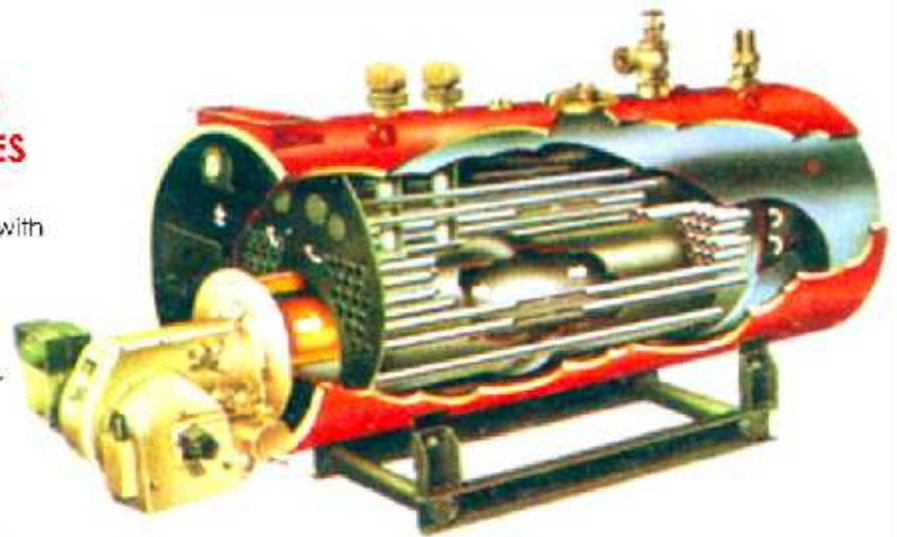
Other optional equipment is available:  
Flow recorders,  
Flue gas Analysers,  
Oxygen based fuel control system for optimal efficiency.

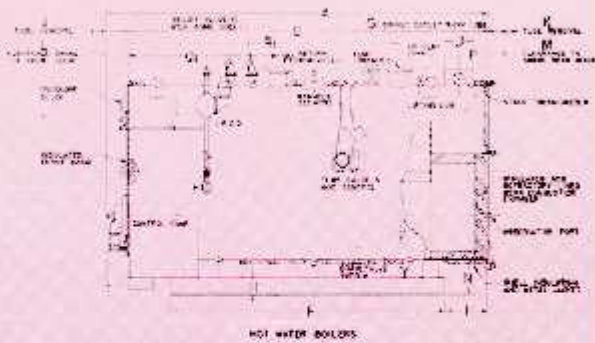
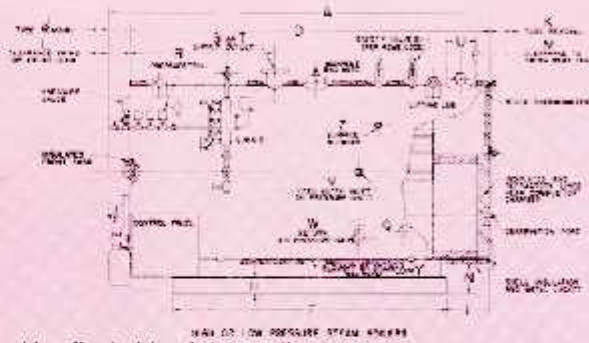
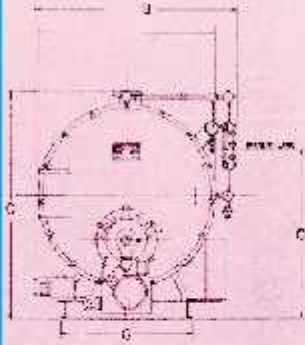
### WET-BACK BOILER DESIGN

#### DEPENDABLE POWERMASTER PACKAGED BOILER FEATURES UNIQUE "TAPERFLOW" DESIGN

A special water circulation feature of the Powermaster wet-back boiler provides active protection in the rear turnaround arch area by increasing the thermally induced velocity of boiler water through this zone. This feature of Powermaster boilers prolongs the life of the rear turnaround area and increases its heat transfer rate. In the illustration, the passage beginning at "A" is gradually constricted to the point "B" exit. Acting as an aspirator, the velocity of water passing through this area cools it more rapidly and increases heat transfer.

**Sizes from: 0.5 ~ 17 tph**  
**Pressures upto 18 bar (g)**





NOTE: Injector assembly, drain or blowoff valve(s) and piping optional.

Certified prints should be secured for each job prior to installation.

RATING, DIMENSIONS AND DATA FOR REVOMAX FT. AVAILABLE IN WETBACK/DRYBACK MODES.		40	50	60	70	80	90	100	125	150	200	250	300
<b>Boiler Output</b>													
Steam Radiation	E.D.R., Sq. Ft.	5580	6950	8400	9800	11120	12600	13900	17370	20850	27800	34750	41700
Water Radiation	E.D.R., Sq. Ft.	8930	11150	13400	15620	17850	20100	22300	27900	33500	44600	55300	66900
Heat Output	1000 BTU/Hr.	1335	1670	2005	2340	2675	3010	3345	4180	5020	6690	8365	10040
Stream Output F&A 212°F	Lbs./Hr.	1380	1725	2070	2415	2760	3105	3450	4300	5200	6900	8600	10500
Heating Surface (ASME)	Sq. Ft.	200	250	300	350	400	450	500	625	750	1000	1250	1500
Oil Firing Rate (150,000 BTU)	G.P.H.	11.2	14	16.8	19.5	22.3	25.1	27.9	34.9	41.8	55.8	69.7	83.7
Gas Firing Rate (1000 BTU/Cu. Ft.)	C.F.H.	1674	2092	2511	2929	3348	3766	4184	5230	6276	8359	10461	12553
<b>Dimensions</b>													
A Overall Length		8'-8"	9'-10"	11'-4"	12'-8"	12'-0"	13'-0"	14'-0"	13'-3"	15'-2"	15'-7"	16'-7"	18'-11"
B Overall Width		5'-0"	5'-0"	5'-0"	5'-0"	5'-10"	5'-10"	5'-10"	6'-7"	6'-7"	7'-0"	7'-6"	7'-6"
C Overall Height (Vent Outlet)		6'-2"	6'-2"	6'-2"	6'-2"	6'-6"	6'-6"	6'-6"	7'-2"	7'-2"	8'-5"	8'-9"	8'-9"
D Boiler Length		7'-40"	9'-0"	10'-6"	11'-10"	11'-0"	12'-0"	13'-0"	12'-6"	14'-5"	14'-9"	15'-9"	18'-1"
E Boiler Jacket Diameter		4'-5"	4'-5"	4'-5"	4'-5"	4'-11"	4'-11"	4'-11"	5'-7"	5'-7"	6'-5"	7'-0"	7'-0"
F Skid Length		5'-5"	6'-8"	7'-11"	9'-3"	8'-4"	9'-4"	10'-4"	9'-11"	11'-10"	11'-3"	12'-3"	14'-7"
G Skid Width		3'-8"	3'-8"	3'-8"	3'-8"	3'-10"	3'-10"	3'-10"	4'-6"	4'-6"	4'-9"	5'-4"	5'-4"
H Skid Height		6"	6"	6"	6"	7"	7"	7"	7"	7"	8"	10"	10"
I Skid to Rear of Boiler		1'-4"	1'-4"	1'-4"	1'-4"	1'-5"	1'-5"	1'-5"	1'-6"	1'-6"	1'-7"	1'-8"	1'-8"
J Tube Replacement — Front		4'-3"	5'-6"	6'-9"	8'-1"	6'-10"	7'-10"	8'-10"	8'-8"	10'-7"	9'-1"	9'-11"	12'-3"
K Tube Replacement — Rear		3'-7"	4'-10"	5'-11"	7'-3"	6'-1"	7'-1"	8'-1"	7'-7"	9'-6"	8'-10"	9'-6"	11'-10"
L Door Clearance — Front		4'-3"	4'-3"	4'-3"	4'-3"	5'-1"	5'-1"	5'-1"	5'-5"	5'-5"	6'-5"	3'-6"	3'-6"
M Door Clearance — Rear		3'-2"	3'-2"	3'-2"	3'-2"	5'-1"	5'-1"	5'-1"	3'-8"	3'-8"	4'-3"	4'-9"	4'-9"
N Floor to Jacket		1'-4"	1'-4"	1'-4"	1'-4"	1'-2"	1'-2"	1'-2"	1'-2"	1'-2"	1'-7"	1'-4"	1'-4"
O Floor to Water Line		4'-8"	4'-8"	4'-8"	4'-8"	5'-1 1/4"	5'-1 1/4"	5'-1 1/4"	5'-5"	5'-5"	6'-6"	6'-8"	6'-8"
P Vent Location		9"	9"	10"	10"	1'-0"	1'-1"	1'-1"	1'-0"	1'-0"	1'-0"	1'-1"	1'-1"
Q Return Location — L.P. Steam		4'-4"	4'-8"	4'-6"	6'-6"	4'-10"	5'-5"	6'-5"	5'-6"	6'-8"	8'-3"	7'-0"	8'-7"
Q1 Return Location — Hot Water		3'-6"	4'-2"	4'-10"	5'-5"	4'-9"	5'-7"	6'-7"	4'-8"	5'-10"	7'-3"	8'-5"	9'-2"
R Supply Location — Hi. & Lo. Press. Stm.		3'-6"	3'-6"	4'-6"	4'-6"	4'-8"	4'-8"	4'-8"	5'-0"	5'-0"	6'-0"	5'-6"	5'-6"
R1 Supply Location — Hot Water		5'-4"	6'-7"	7'-10"	8'-10"	8'-4"	9'-0"	10'-0"	9'-0"	10'-11"	11'-2"	11'-8"	14'-0"
S Supply Size — Hi. Press. Stm.		2"	3"	3"	3"	3"	3"	3"	4"	4"	6"	6"	6"
S1 Supply Size — Hot Water		3"	4"	4"	4"	4"	4"	4"	6"	6"	6"	8"	8"
T Supply Size — Lo. Press. Steam		4"	4"	6"	6"	6"	6"	6"	8"	8"	10"	10"	10"
U Vent Outlet Diameter		10"	10"	1'-0"	1'-0"	1'-0"	1'-2"	1'-2"	1'-4"	1'-4"	1'-6"	1'-10"	1'-10"
V Feed Inlet Size — Hi. Press. Stm.		1"	1"	1"	1"	1"	1 1/4"	1 1/4"	1 1/4"	1 1/4"	1 1/2"	2"	2"
W Return Size — Lo. Press. Stm.		3"	3"	4"	4"	4"	4"	4"	4"	4"	4"	4"	4"
W1 Return Size — Hot Water		3"	4"	4"	4"	4"	4"	4"	6"	6"	6"	8"	8"
X Bottom Blowoff Size — Hi. Press. Stm.		1"	1"	1"	1"	1"	1 1/4"	1 1/4"	1 1/4"	1 1/4"	1 1/2"	2"	2"
Y Drain Size — Lo. Press. Stm. & Hot Wtr.		1 1/2"	1 1/4"	1 1/4"	1 1/4"	1 1/4"	1 1/2"	1 1/2"	2"	2"	2"	2"	2"
Z Surface Blowoff Size		1 1/2"	1 1/2"	1 1/2"	1 1/2"	1 1/2"	1 1/2"	1 1/2"	1 1/2"	1 1/2"	1 1/2"	1 1/2"	1 1/2"
<b>Approximate Weights</b>													
High Pressure — Empty		6350	6900	7450	8500	10850	12300	12400	14550	16950	22300	24410	28610
High Pressure — Water Line		8400	9460	10500	12100	14950	16930	17550	20600	24750	31950	36040	41750
Low Pressure — Empty (Stm. & H. W.)		5450	6550	7900	8800	9300	9560	9560	11750	13250	18000	19800	23900
Low Pressure — Water Line		7500	9110	9750	10900	12900	13930	14710	17800	20550	27650	31430	37050
Hot Water — Flooded		8150	9930	10150	12050	13800	14920	15810	19750	22010	29900	35110	42330
<b>Gallons</b>													
Gallons to Water Line		247	308	368	434	494	557	620	728	877	1157	1395	1977
Gallons — Full		326	406	487	572	600	676	753	964	1161	1430	1836	2211

Available in Sizes upto 1200 HP, 250 Psig. In Natural Gas, Diesel, HFO and Combination burners, with or without economisers.

## GRESHAM'S BOILERS: THE COMMITMENT

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### Gresham's Boilers exported to:

France,  
 Italy,  
 Algeria,  
 Iraq,  
 UAE,  
 Saudi Arabia,  
 Sri Lanka,  
 Bangladesh,  
 Myanmar  
 and Aghanisatan  
 are a testimony of our quality.

Boilers of Firetube, Watertube, Forced circulation Steam, Generators, Waste Heat Recovery Units, Power plant boilers, Thermo oil Boilers, Hot air generators, RO & Water Treatment Plants, Heat Exchangers, Equipment for oil and gas industries, Portable accommodation systems, Filtration Plants are manufactured under licence agreements from world renowned brands such as Powermaster Keeler, Wanson, Ygnis, Alpha boiler to give you a highly engineered, safe & efficient products built to ASME Standards and Inspected by Germanischer Lloyds, IUV, SGS.

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