Preferred
Heavy Duty - Forced Draft
THERMOPAK / Inject-Aire

- HEAVY OIL
- LIGHT OIL
- GAS
- COMBINATION OIL / GAS

LOWER ELECTRICAL CONSUMPTION - HIGHER EFFICIENCY

PREFERRED UTILITIES MANUFACTURING CORPORATION
PREFERRED Engineered-Fabricated-Tested

Photographed in action... pictured is only one of the unique capabilities of the THERMOPAK/Inject-Aire that enables Preferred to custom engineer a combustion system dedicated to combustion excellence.

Just what is a forced draft THERMOPAK/Inject-Aire?

The THERMOPAK/Inject-Aire is a fully integrated combustion system individually engineered to the requirement of a specific installation. It combines extra heavy-duty mechanical construction with a High Efficiency Inject-Aire type burner and places it under the control of a state-of-the-art Combustion Control and Burner Management System.

Application considerations

The THERMOPAK/Inject-Aire has repeatedly demonstrated that combustion excellence is a matter of system design and independent of boiler selection.

- **Boiler design**... Application flexibility permits system installation on most new or existing boilers of all types: cast iron, H.R.T., steel firebox, water tube, Scotch marine.
- **Fuel input**... available from 2,250 to 29,250 MBH with higher inputs available on application.
- **Type of fuel**... fires all grades of fuel oil including distillates, blends, — including high paraffin 4, residuals, — including heavy 6. Natural, manufactured, low Btu and waste gases. Combination oil/gas.

- **Forced draft design**... suitable for firing with tall or short stacks, negative or positive furnace pressures.
- **Existing electrical service**... exceptionally low power requirements can substantially reduce installation cost by re-use of existing electrical feeders.
- **Level of maintenance**... heavy-duty design priority emphasizes longer life combined with increased reliability and reduced maintenance, — paramount considerations for schools, institutions, apartment complexes and industrial plants.
- **Design variations**... for waste liquids, incineration, process, and continuous firing with massive hot refractory exposure.

Fueloil selection considerations

Regulations restricting the type of fueloils permitted in specific areas have been constantly changing. To provide economic purchasing advantage — fueloil grade versus price — the THERMOPAK/Inject-Aire can either be initially selected to burn all grades of oil or contain future modification capability.
Here are the differences in a forced draft
**THERMOPAK/Inject-Aire combustion system**

A burner to fit every need... All burners are forced draft, heavy cast construction and will deliver a consistently high efficiency with a significantly lower electrical consumption. Burner selection is dictated by the type of fuels with the essential differences being in the oil pumping, preparation and metering systems.

**Universal burner — Model BHE/R — fires gas and 2,4,5, low sulphur and heavy No. 6 fuel oil. Look at the differences!

- **Integral primary and secondary pumps**... Slow speed pumps are completely submerged in a reservoir of heated oil. Positive burner re-start is assured even after long periods of shut down.

- **Volvulave oil metering system**... delivers a linear flow of precisely metered oil to the burner atomizer throughout the entire firing range. The system automatically compensates for variations in oil temperature, viscosity and pressure. Volvulave oil metering combined with Vortex combustion air control produces a consistently efficient fuel/aer ratio, reduced excess air firing, and low flue gas O₂.

- **Firing rate limiting**... maximum fuel input is actually restricted to the safe and efficient design rating of the burner and boiler. Volvulave metering accuracy permits burner selection in increments of 5 gph.

- **Firing rate dial**... provides at-a-glance indication of fuel input. Permits effective boiler base loading during heavy loads and accurate, anti-short cycling adjustments during light loads.

- **Multi-stage oil atomization system**... with the final stage using an integral impeller fan to blast a controlled volume of high static pressure air directly into the oil. Even the heaviest fuel oil is reduced to microscopic particles without the use of power consuming, maintenance prone compressors.

- **Self-cleaning, clog-free atomizer**... The atomizer is large ported and is cooled and purged of any oil residue after each firing cycle.

- **Self-cleaning igniter**... a premix type gas/electric pilot burner produces a hotter, more stable flame while using only one-half cubic foot of natural gas per burner light-off. For maximum reliability it is air-jet cooled and cleaned during the entire firing cycle.

- **Gas firing**... Inject-Aire features a nozzle mix, power gas burner constructed of a heavy cast iron, multi-ported, circular firing ring. For added protection during oil firing, the ring is imbedded in refractory and kept clean and cool by a barrier of air.

- **Fuel changeover**... Alternate fuel firing requires the mere positioning of an electric switch. Automatic changeover is available when required.

**Combustion air system**

The method of air introduction, distribution and control directly affects the burner excess air requirements and flame propagation rate, stability, temperature and cleanliness. For long term efficiency and reduced maintenance the THERMOPAK/Inject-Aire includes several large power plant design concepts.

- **Heavy duty windbox**... boiler plate construction includes arch brick design using stock-size, high temperature (3240-3310°F), 60% alumina diasporic brick. Close tolerance windbox fabrication assures equal air distribution into critical combustion areas.

- **Combustion air**... is furnished by a centrifugal fan enclosed in an efficient, matched scroll housing. Slow speed operation of 1750 rpm assures extra years of quiet, reliable operation.

- **Vortex control of combustion air**... Unique Vortex Damper design provides an accurately proportioned air flow corresponding to the metered volume of fuel flow. A consistently efficient fuel/air ratio is maintained throughout the entire firing range.

- **Radial air injection**... The Vortex Damper proportioned volume of combustion air is pre-heated and radially forced directly into the flame. Radial air introduction provides an ultra-mix of fuel and air and eliminates the need for power consuming vanes and swirlers.
Combustion control and burner management

System is fully integrated and enclosed in a pre-wired and factory tested control cabinet. With the selection of a minimum function system, the cabinet can be factory installed as an integral unit with the THERMOPAK/Inject-Aire. Typical systems include optional controls and instruments with cabinets designed for remote installation. Optional controls and instruments include:

- Automatic Draft Controls
- Oxygen Trim Systems
- Flue Gas Temperature Indicators
- Draft Indicators
- Smoke-Opacity Monitors
- Manual/Automatic Stations
- Boiler Load Management Systems for Multi-Boiler Plants

The control system will be designed to accommodate any insurance or local requirements.

Engineering and Rating Data

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<th>SIZE</th>
<th>2</th>
<th>3</th>
<th>4</th>
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<th>6</th>
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<tr>
<td>Capacity (nominal) MBH</td>
<td>2250</td>
<td>3000</td>
<td>3750</td>
<td>4500</td>
<td>6750</td>
<td>9000</td>
<td>14250</td>
<td>18000</td>
<td>22500</td>
<td>26250</td>
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Fuel Input Hourly

| BE and BHE Burners | Max Volulave Oil | Metering Rate | Ll, oil, 1,40,000 BTU | Gal. | 17 | 21 | 27 | 32 | 35 | 40 | 50 | 55 | 60 | 75 | 100 |
|---------------------|------------------|---------------|----------------------|------|----|----|----|----|----|----|----|----|----|----|----|----|
|                     | Hy, oil, 150,000 BTU | Gal. | 15 | 20 | 25 | 30 | 45.3 | 50.1 | 95.8 | 120.1 | 150.3 | 175.0 | 197.5 |
| Gas 1050 BTU | Cu Ft. | 2143 | 2657 | 3571 | 4286 | 6429 | 8571 | 13571 | 17143 | 21429 | 25000 | 27857 |

Electrical Loads

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<th>Combustion Air Fan Motor</th>
<th>H.P.</th>
<th>½</th>
<th>¾</th>
<th>1</th>
<th>1¼</th>
<th>1½</th>
<th>2</th>
<th>3</th>
<th>5</th>
<th>7½</th>
<th>10</th>
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<tr>
<td>Burner Motor H.P.</td>
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<td>½</td>
<td>1</td>
<td>1½</td>
<td>2</td>
<td>3</td>
<td>5</td>
<td>7½</td>
<td>10</td>
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<td>Oil Heater (BHE) K.W.</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>(2½)</td>
<td>(2½)</td>
<td>(2½)</td>
<td>(2½)</td>
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<td>Integral Pump Data BE/BHE QPH</td>
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<td>62</td>
<td>92</td>
<td>122</td>
<td>152</td>
<td>164</td>
<td>190</td>
<td>233</td>
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<td>RPM</td>
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<td>206</td>
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<td>256</td>
<td>256</td>
<td>256</td>
<td>273</td>
<td>312</td>
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*1 Data subject to change when furnace pressure exceeds +0.75" w.c. or with elevations above 1000 feet.
*2 MBH as shown is actual for BHE burner or when firing gas. Actual MBH for BHE and BE burners is determined by "Maximum Volulave Oil Metering Rate" as shown.
*3 For input limiting, BHE and BE burners may be specified in 5 gallon increments up to the "Maximum Volulave Oil Metering Rate" shown.
*4 Consult factory on BHE and BE burners.
*5 Gas pressure of 28" w.c. at inlet to gas pressure regulator permits most economical valve train selection.

Specifications subject to change without notice.

Burner selection...a THERMOPAK/Inject-Aire burner for every requirement.

Model BHE...Suitable for all grades of oil and recommended where the oil requires pre-heating as a current requirement or future possibility. Burner is as described on page 3 and includes as standard: dual pumps submerged in a reservoir, Volulave oil metering, multi-stage atomization system, self-cleaning atomizer, gas/electric ignition, air proving switch and oil strainer. Oil heating system includes: reservoir heater, cold oil interlock switch, oil thermometer, and thermostatically controlled nozzle line heater capable of increasing the temperature of the full burner firing rate by 40°F.

Model BE...Suitable for all grades of oil not requiring preheating and recommended where the oil could be either a blend or a light residual grade requiring compensation for variations in viscosity or pressure. Model BE is similar to BHE with the oil heating system omitted.

Model BG...Suitable for grades of oil not requiring pre-heating and where compensation for variations in oil viscosity or pressure is not required. The burner omits the pumps, reservoir, Volulave metering and heating system from the BHE. The BG burner requires remote pumping; firing rate is controlled by a Preferred Rotary Slot Oil Metering Valve.

Gas firing...When any of the above are designed for combination gas/oil firing, the burner includes a gas burner and fuel changeover switch as described on page 3, plus an atomizing air interlock switch. Gas train components are shipped loose for job site installation in the gas piping. A manual pump disconnect clutch is provided to permit disconnection of oil circulation during extended periods of gas firing.

Future gas...If gas firing is a future consideration the burner will be equipped with all the gas components. Loose items will be properly sized and purchased when gas becoms available.

Approved by...
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Commonwealth of Massachusetts, Dept. of Public Safety No. 1083

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