**Rite Durafin Guide Specification (Uncontrolled Emissions)**

1. **Basis of design**
	1. The boiler selection is based on a Rite model \_\_\_\_\_\_\_\_\_ Durafin (or approved equal) with a maximum allowable working pressure of 160 psig. This design is classified as a horizontal, inclined watertube boiler.
	2. The boiler shall operate with a minimum efficiency of 85% with a heat input of \_\_\_\_\_\_\_\_\_\_\_MBTU/hr when fired on natural gas. Electrical power shall be \_\_\_\_\_/\_\_\_\_\_/\_\_\_\_\_.
2. **Boiler Design Overview**
	1. The boiler shall be a steel boiler, impervious to thermal shock and without a minimum or maximum flow requirement.
	2. Boiler efficiency shall be a minimum 85%.
	3. The boiler shall be designed for continuous operation with return water temperatures between 135° and 230° F.
	4. The boiler and burner shall be shipped completely assembled as a package and shall meet the latest requirements of UL 795, UL 726, ASME CSD-1, ANSI Z21.13, NFPA 70 and ASHRAE 90.1.
3. **Boiler Construction**
	1. The pressure vessel shall be built in accordance with ASME section IV and be registered with the National Board. The boiler shall be provided with a National Board number.
	2. The heat exchanger shall have over 7 square feet of dry heating surface per boiler horsepower.
	3. The combustion chamber (furnace) heat release shall not exceed 81,000 BTUH per cubic feet.
	4. The combustion chamber shall be sealed to operate up to .15 inches of water column. A pressure gauge shall be provided to show the overfire pressure.
	5. The combustion chamber shall have a minimum 2-inch diameter flame observation port at the front and rear of the combustion chamber.
	6. The boiler shall be equipped with a hinged burner mounting door to provide full access to the combustion chamber for inspection, maintenance and repair.
	7. The boiler tubes shall facilitate easy mechanical cleaning of their watersides with simple tube brushes or scrapers.
	8. The pressure vessel shall be manufactured using straight, large bore, non-proprietary boiler tubes. Boiler tubes shall be available through multiple sources.
	9. Tubes shall be mechanically expanded into header boxes and shall not require any beading or welding.
	10. Plugging a leaky tube shall be easily accomplished with common pipe fittings readily available at hardware and plumbing supply houses.
	11. The boiler shall be engineered with lineal slide assemblies to accommodate thermal expansion without stressing the boiler tubes or tube sheets.
	12. The boiler watersides shall be accessible via hinged and gasketed pressure vessel headplates. When the headplates are opened, all of the boiler waterside tubes, supply nozzles and return nozzles shall be visible and exposed for inspection, mechanical cleaning and repair.
	13. There shall be no minimum or maximum water flow rate required through the heat exchanger. A flow switch shall not be required.
	14. Tube replacement or cleaning shall require “zero” inches of maintenance clearance on either side for boilers over 500,000 btu/hr.
	15. The boiler shall carry a 25-year manufacturer’s warranty against thermal shock and tube erosion.
4. **Boiler Trim**
	1. The boiler shall be provided with an automatic reset operator temperature control and a separate, manual reset high temperature limit control.
	2. The boiler shall come complete with a probe type low water cut-off installed in the primary vessel with manual reset and push-to-test functions. Column-type water level sensors that require repetitive blowdowns are not allowed.
	3. The boiler shall have a low return water temperature warning light, to alert the operator to damaging flue gas condensation conditions in the boiler.
	4. The boiler shall be rated for 160 psig, the safety relief valve shall be set for \_\_\_\_ psig.
5. **Burners**
	1. The basis of design is the Powerflame type C model \_\_\_\_\_\_\_\_ forced draft, high turndown, flame retention type, natural gas burner.
	2. The burner shall be of welded steel construction. The burner head shall carry a full (5) five-year replacement warranty (see Powerflame burner warranty for details).
	3. The burner shall provide full modulation with a minimum turndown of \_\_\_-\_\_\_ from high to low fire.
	4. The main on/off gas supply shall be controlled by a motorized gas valve or as code allows.
	5. Fuel/Air proportioning shall be by a single modulating motor controlling the positioning of the air inlet damper and butterfly type gas-proportioning valve to meet varying system loads via mechanical linkage.
	6. The mechanical linkage shall utilize a quadrant linkage adjustment mechanism with adjustable high and low fire valve stops with a spring over travel protection mechanism.
	7. The UL rated gas train shall contain the following:
		1. Manual shut-off valve
		2. Main gas regulator
		3. Automatic main motorized gas valve, proof of closure switch required for burners over 5.0MBtu/H or as code allows
	8. All control components shall be mounted and wired within an integral burner mounted control panel.
		1. The panel shall incorporate an "Easy Access" (lift off) cover, and will include Power On, Main Fuel, Load Demand, FSG Alarm and Low Water indicating lights. An On/Off control switch, Manual Auto selector switch with indicator light and manual potentiometer.
		2. Each burner will require a step-down control transformer with primary and secondary fusing for the control voltage.
		3. A mounted disconnect and motor fusing for single point power connection shall be provided.
		4. Each burner panel will have terminals to connect to remote panel. Supply local and header mounted operation and modulating controls.
		5. The burner manufacturer shall provide an insurance certificate documenting his current coverage of Product Liability Insurance with minimum coverage of $10,000,000 upon request.
6. **Exhaust System**
	1. The boiler shall be designed to allow multiple venting options, including; B Vent, Category I and Category III.  The exhaust system design shall determine the correct venting option.