

# Eddy's Boilerhouse News

## TIP OF THE MONTH FOR THE MAINTENANCE DEPARTMENT

By Eddy Emerson

### **FIRING RATE**

I have received so many questions on burner efficiency, combustion and firing rate controls since the fuel increase this year that I decided I will do a whole series on these subjects. Before we get into burner efficiency and combustion we must have a good handle on just exactly what is firing rate. Therefore, the first few newsletters will be on firing rate. And, it has nothing to do with how many people have been fired at your place of employment.

### **FIRING RATE**

#### **INTRODUCTION**

Firing rate is the rate at which air and fuel are supplied to the burner for combustion. On-Off burners have a fixed firing rate or one air and fuel setting. Low-High firing is a two stage operation with two fixed positions for firing. Then there is what we call full modulation it simply has a means of regulating fuel and combustion air in a proper ratio according to load demand.

Generally the load demand is based on output water temperature in a hydronic boiler and steam pressure in a steam boiler.

LOAD	–	FUEL	COMB
Pressure		Gas	Air
Temp.		Oil - Other	
Decrease		Increase	Increase
Increase		Decrease	Decrease

**REMEMBER:** Anytime the fuel supply is varied the combustion air must be varied in a proper ratio. Likewise, if the combustion air is varied the fuel supply must also change.

Automatic firing rate controls are often used to simplify operation and to relieve operators from

tedious monitoring duties. However, their primary purpose is for economy.

To produce the most economical operation, the control system must maintain the air-fuel ratio at an optimum value over the entire load range. Usually, the system must also control other important factors such as steam pressure, furnace draft, water level, and steam temperature. It is virtually impossible for an operator to maintain the precise control necessary to achieve the greatest economy.

#### **TURNDOWN RATIO**

Turndown is the ratio of the maximum firing rate (high fire) to the minimum firing rate (low fire) at which a burner will operate satisfactorily. It is also expressed as the range of firing rates over which satisfactory combustion can be obtained. For example, the firing rate of a burner with a 4 to 1 turndown ratio can be varied from its maximum of 100% down to its minimum of 25%. Simply said, with a 4 to 1 turndown the minimum firing rate will be 1/4 of the maximum firing rate.

Each burner/boiler is designed with a specific turndown ratio. It is important to consult with the burner/boiler manuals to obtain the proper firing rates and turndown ratios prior to adjusting (calibrating) a burner. Burners are not designed to operate outside their specific rate.

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