

Eddy's Boilerhouse News

TIP OF THE MONTH FOR THE MAINTENANCE DEPARTMENT

By Eddy Emerson

Heating Combustion Air

Increasing the temperature of your combustion is one of the cheapest ways to increase efficiency and save some of them bucks you have work so hard for.

In an earlier newsletter, I showed what could be done toward reducing the fuel bill by lowering the stack gas temperature by heat reclamation with economizers. I showed you how the efficiency increases as the difference between the exit flue gas temperature and the boiler room temperature decreases. This was assuming that the boiler room air was the temperature of the air actually entering the combustion system. This may be the case in many boiler rooms, but it is seldom the most efficient method of supplying the air for combustion.

It is commonly understood in the boiler industry that increasing the combustion air temperature will increase the boiler efficiency 1% for each 40°F rise in air temperature. Put into equation form for ease of calculations:

$$\text{Percentage increase in efficiency} = \frac{\text{Increase in combustion air temperature}}{40}$$

There are three general methods for accomplishing the increase in air temperature entering the draft fan.

The hottest point in the boiler room is usually directly over the boiler, or very close to the boiler near the ceiling. Figure 1 shows that the best place to take the air for

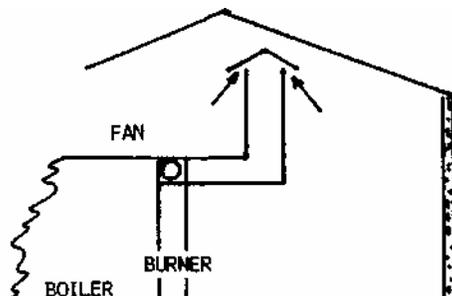


Fig. 1 increasing combustion air

combustion is near the ceiling of the boiler room. It is not uncommon for the air in that location to be at least 40°F above the temperature of the air at floor level, which means you, can count on at least 1% fuel savings by the method shown here in Fig. 1. The ducting will have to be sized correctly and the blower checked for sufficient capacity and power if you convert your ducting to this system.

Another method of increasing the temperature of the combustion air is found on larger installations.

In the newsletter on economizers, I showed economizers as being one of the preferred methods of reclaiming heat from the flue gas. This method may in some cases be extended to the addition of another heat exchanger between the economizer and the point of exit for the flue gas. This is possible only if the flue gas leaving the economizer is still hot enough to contain sufficient heat for raising the combustion air temperature without being reduced to the dew point of the lower-temperature flue gas. The temperature of the leaving flue gas must be watched very closely to prevent condensation.

To use this method for reclaiming additional heat from the flue gas, it is necessary that some engineering be performed, and we recommend that a firm experienced in supply of this type of equipment be called in. The heat exchangers are known as air pre-heaters.

The air pre-heaters in most common use in industry are the fin-tube and the plate styles. Pressure is very low on both sides of the exchange surfaces, so relatively light construction is possible.

The third method of raising the combustion air temperature is to place a steam or hot-water coil ahead of the draft fan intake. This is best done when excess heat in waste water or steam is available, which would normally be wasted. The

draft fan will have to be checked for capacity and power, as the increased resistance on the inlet to the fan will affect the fan's performance, as will also the increased air temperature.

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