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TECHNICAL SERVICE BULLETIN

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SUBJECT: CO_2 TEST AND ITS IMPORTANCE

To check combustion efficiences, some of us still follow the rule of thumb of merely looking at a fire and determining its rate of efficiency. People who have been in the service business for numerous years have learned through experience that the only accurate way of arriving at these efficiencies is to test the unit and fire with instruments. In this instance, we are concerned only with the CO_2 analyzer. In a complete combustion test, it is necessary to use a smoke tester, stack thermometer, draft gauge, as well as the CO_2 analyzer.

If pure carbon is burned in the presence of pure oxygen, the product of this chemical reaction is carbon dioxide. Formula being: C - Carbon plus 2 parts oxygen - O_2 equals CO_2. Light fuel oils are assigned a carbon dioxide content approximating 15 percent by volume of the flue gases. Excess air must be provided in order that each droplet of oil will receive its proper amount of oxygen. When we are unable to supply the correct amount of oxygen to the gas formed by the atomization of the oil, we then will only realize a small percentage of the total heat value. If, on the other hand, we induce too much excess air, the travel of gases would then be too rapid and would not allow the unit sufficient time to absorb the total heat value. This results in high stack losses. A combination of both conditions is ideal and results in the highest CO_2 tests. Any induced air, other than through the oil burner, will need to be heated to stack temperature in order to exhaust it and thereby cause a loss of CO_2.

Anytime we have excessive smoke and leave a fire in this condition, we are only kidding ourselves. True, we will get a high CO_2 reading with high smoke, but what are we doing with such a condition? We are sooting up the boiler of flue passages, heat exchanger, smoke pipes, chimney, etc. Now, should it be that we had a bad draft condition to start with, it is possible that we have added enough to it, with the continued buildup of this soot, to begin to cause pulsation. In addition, carbon is one of the best insulators in the world, and now the unit can't absorb the hot gases and the homeowner is spending money on excessive oil bills. This homeowner has now become a prime target for the gas industry.

We do not wish to say at this point what readings you should normally incur, but in the field we do believe that we could classify them as follows:

7%-8% FAIR, 8%-10% GOOD, 10% & up EXCELLENT

All of these should be with a good or acceptable smoke reading.